



# Tools of the Mind

## RFP# DOE-PDO-2015-11



Complete proposal  
with signature



# RFP# DOE-PDO-2015-11

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**COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF EDUCATION  
REQUEST FOR PROPOSAL (RFP)**

Issue Date: June 10, 2015 RFP# DOE-PDO-2015-11

Title: Professional Development Options for VPI+ Early Learning Providers

Commodity Code: 92416 and 92441

Issuing Agency: Commonwealth of Virginia  
Department of Education  
101 North 14<sup>th</sup> Street  
Richmond, Virginia 23219

Using Agency And/Or Location  
Where Work Will Be Performed: Virginia Public School Divisions

Initial Period Of Contract: From Date of Contract Award Through June 30, 2019 (renewable).

Sealed Proposals Will Be Received Until **2:00 P.M., July 10, 2015** For Furnishing The Goods/Services Described Herein. No proposal shall be accepted after this deadline unless the due date has been previously changed by an Addendum.

All Inquiries For Information Should Be Directed To: Marie Williams Via E-mail [marie.williams@doe.virginia.gov](mailto:marie.williams@doe.virginia.gov) by **5:00 P.M., July 1, 2015**.


PROPOSALS MUST BE DELIVERED TO THE JAMES MONROE BUILDING, 101 N. 14<sup>TH</sup> STREET, RICHMOND, VA, 23219, 21<sup>ST</sup> FLOOR, DEPARTMENT OF EDUCATION PROCUREMENT OFFICE, TO THE ATTENTION OF: Marie Williams (See Section X, #7. Identification of Proposal Envelope.) This is NOT a mailing address. It is recommended that proposals be hand delivered or express delivered in advance of the due date and time set for receipt of proposals.

In compliance with this Request For Proposals (RFP) and all conditions imposed in this RFP, the undersigned firm hereby offers and agrees to furnish all goods and services in accordance with the attached signed proposal or as mutually agreed upon by subsequent negotiation, and the undersigned firm hereby certifies that all information provided below and in any schedule attached hereto is true, correct, and complete.

\* Virginia Contractor License No. \_\_\_\_\_ \* DSBSD-certified Small Business No. \_\_\_\_\_  
Class: \_\_\_\_\_ Specialty Codes: \_\_\_\_\_

Name And Address Of Firm:  
Third Sector New England (Tools of the Mind)  
89 South Street, Suite 700

Boston, MA Zip Code: 02111  
eVA Vendor ID or DUNS #: VC0000154740  
Fax Number: 617-395-2635  
E-mail Address: [aalvis@toolsofthemind.org](mailto:aalvis@toolsofthemind.org)

Date: July 7, 2015  
By:   
(Signature In Ink)  
Name: Angela Alvis  
(Please Print)  
Title: Regional Training Manager  
Telephone Number: 360-556-8060

**PREPROPOSAL CONFERENCE:** An optional proposal conference will be held at **11:00 A.M on June 23, 2015**, in the Harrison Conference Room on the 24th floor of the Monroe Building, located at 101 N. 14<sup>th</sup> Street, Richmond, VA 23219 (Reference: Section X, Paragraph 8 herein). If special ADA accommodations are needed, please contact Marie Williams at 804 225-2040 or [marie.williams@doe.virginia.gov](mailto:marie.williams@doe.virginia.gov) by **11:00 A.M on June 18, 2015**.

**Note:** This public body does not discriminate against faith-based organizations in accordance with the *Code of Virginia*, § 2.2-4343.1 or against a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.



June 29, 2015

ADDENDUM NO.1 TO ALL OFFERORS

Reference – Request for Proposal:	RFP #DOE-PDO-2015-11
Commodity Code:	92416 and 92441
Dated:	June 10, 2015
For Delivery To:	Department of Education
Offer Due:	Until 2:00 PM, July 10, 2015
Pre-proposal Conference:	11:00 a.m., June 23, 2015

The above is hereby changed to read:

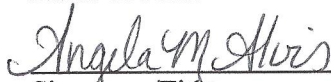
1. Reference Section II. BACKGROUND, Page 5, Table I, Total # New Classrooms Years 1-4 for Henrico: change “10” to “53.”
2. Reference Section IV. STATEMENT OF NEEDS, page 9, D: change text to “The contractor must certify that all employees and subcontractors who will provide services on school property have not been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child, and agree to provide such certification on a form required by the local school division, if requested (see VA Code§ 22.1-296.1).”
3. Reference Section V. B. SPECIFIC PROPOSAL INSTRUCTIONS #2: add “iv. Certification that all employees and subcontractors who will provide services on school property have not been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child, and agreement to provide such certification on a form required by the local school division, if requested (see VA Code§ 22.1-296.1).”
4. Reference Attachment D and references to Attachment D on page 12 and 24: Replace original Attachment D with “Attachment D – Revised Response Template for Professional Development Offering.”
5. Reference Attachment E and references to Attachment E on page 12 and 24: Replace original Attachment E with “Attachment E – Revised Pricing Schedule.”

Note: A signed acknowledgment of this addendum and attachment must be received at the location indicated on the RFP either prior to the proposal due date and hour or attached to your proposal. Signature on this addendum does not substitute for your signature on the original RFP document. The original RFP document must be signed.

Marie Williams, VCO  
Director of TCP, Procurement, & FA  
804-225-2040

Third Sector New England (Tools of the Mind)

Name of Firm



Regional Training Manager

Signature /Title

July 7, 2015

Date



State Corporation Commission Form

Virginia State Corporation Commission (SCC) registration information. The offeror:

- ☐ is a corporation or other business entity with the following SCC identification number: \_\_\_\_\_ **-OR-**
- ☐ is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust **-OR-**
- ✓ ☐ is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the offeror in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from offeror's out-of-state location) **-OR-**
- ☐ is an out-of-state business entity that is including with this proposal an opinion of legal counsel which accurately and completely discloses the undersigned offeror's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.
- \*\*NOTE\*\*** >> Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for proposals (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver): ☐



## Confirmation of Acceptance

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Tools of the Mind accepts the RFP General and Special Terms and Conditions as outlined in Sections IX and X of RFP# RFP# DOE-PDO-2015-11.

 /ToolsoftheMind  
 @Tools\_Mind

Tools of the Mind | [www.toolsofthemind.org](http://www.toolsofthemind.org)



## Proprietary or Trade Secret Materials

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No proprietary or trade secret materials are submitted by Tools of the Mind as part of RFP# DOE-PDO-2015-11.

 /ToolsoftheMind  
 @Tools\_Mind

Tools of the Mind | [www.toolsofthemind.org](http://www.toolsofthemind.org)



**Data Security Template**

If professional development offerings are delivered online, or sensitive data is collected or transferred as part of the professional development offering, the Offeror must complete this template. If any questions are not applicable, the Offeror must explain why.

1. A list of variables collected or transferred;

Live-interactive webinars will be conducted with participants four times during the year to support their understanding of the curriculum. Participants may also complete eLearning modules linked to the curriculum to explore concepts. Registrants register for these resources using an email address and name to gain access to both the eLearning and webinar formats. No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

2. Format(s) in which data will be provided;

No data will be collected from teachers or students

3. Methods used to ensure secure data transfer, including a method of protecting against unauthorized access to sensitive data;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

4. The number of data transfers and timeframe within which data can be made available to authorized personnel;

Not applicable

5. A method of protecting against unauthorized access to sensitive data;

Not applicable

6. Weekly backups with incremental daily backups and a 48-hour recovery from the loss of a data center including the loss of only 2 hours of data;

Not applicable

7. A suitable hosting environment;

Please describe the environment including primary site location(s) and disaster recovery location(s), internet connectivity, power management and site security and describe the relationship between the primary site(s) and recovery site(s) and any industry certifications that these facilities have achieved (e.g. Tier III/IV, SAS70, SOC1, SOC2, etc.).

Not applicable

8. Data archival policies and any data purge policies;

Not applicable

9. A process for handling and notification of a breach of non-public data;

Not applicable

10. A process for the authorization of various roles associated with data access;

No data will be collected on teachers accessing web based learning modules

11. A policy for only allowing remote access using industry standard network security processes;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

12. A process for ensuring security of data stored at the offeror's site as well as any server security policies;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

13. A process for identifying and remediating software defects;

Should teachers have issues accessing our online webinars or elearning modules there is a process by which they can email their issues to the Tools of the Mind organization so that we may explore whether the issue was caused by our programs or hosting site or provide the teacher with guidance on troubleshooting at the user end around issues related to internet speed etc.

14. A process for incident management, change management, and release management;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

15. A process for how school divisions will get their data back in a form that can be used in the event of contract termination or expiration or if the a different service is desired;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

16. Network-layer vulnerability scans conducted regularly;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

17. Application-layer vulnerability scans conducted regularly;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

18. Local operating system-layer vulnerability scans conducted regularly;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

19. File integrity (host) and network intrusion detection (IDS) tools that are implemented to help facilitate timely detection, investigation by root cause analysis and response to incident;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

20. Regular penetration testing, vulnerability management, and intrusion prevention;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

21. Network devices that are located in secure facilities and under controlled circumstances (e.g. ID cards, entry logs);

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

22. A standard time frame regarding how quickly patches are applied from the time of supplier release;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.



23. Background checks on your firm's personnel with physical and/or administrative access to network devices, servers, applications and customer data;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

24. Processes for authenticating callers and resetting access controls, as well as establishing and deleting accounts;

No sensitive information will be collected, shared or transferred through webinars or on eLearning platforms.

25. Protection against denial-of-service attack;

Our eLearning opportunities involves an iPad app entitled, iScaffold. Since iScaffold is designed to work offline as well as online, the application itself is particularly robust to network or server failures. iScaffold has two servers, both hosted on leading cloud service providers:

iScaffold authentication server which is hosted on scalable Google Cloud infrastructure, has the following protections:

- Makes use of Google App Engine Denial of Service (DoS) Protection Service, which allows for black listing of offending IP addresses, subnets, and IP blocks
- Is dynamically scalable to handle unexpected increases in traffic
- Server address and API are not published, to support security through obscurity
- Includes 24/7 automated monitoring which informs operations in the event of a server going down

The iScaffold Content Server, which is used to serve iScaffold content which is then cached on individual devices uses CloudFlare which provides protection for a variety of different DoS style attacks, as described here: <https://www.cloudflare.com/ddos>.

26. Technical measures and techniques for detection and timely response to network-based attacks such as distributed denial-of -service (DDoS) attack; and  
See response to #25 above.

27. A statement confirming that the offeror shall:

- a. Comply with Virginia's Information Technology Security Policy and Standards (<http://www.vita.virginia.gov/library/default.aspx?id=537#securityPSGs>);
- b. Comply with the Family Educational Rights and Privacy Act (FERPA);

- c. Meet cloud security requirements by a certifying body such as Fed-RAMP (<http://cloud.cio.gov/fedramp>), if applicable
- d. Include a product support program for users and administrators;
- e. Be Section 508 compliant ([http://www.vita.virginia.gov/uploadedfiles/vita\\_main\\_public/unmanaged/library/contingencyplanningguideline04\\_18\\_2007.pdf](http://www.vita.virginia.gov/uploadedfiles/vita_main_public/unmanaged/library/contingencyplanningguideline04_18_2007.pdf));
- f. Include a backup and recovery plan that is tested at least annually;
- g. Include an outage plan. Users shall be notified of anticipated and unanticipated outages;
- h. Adhere to the Student Privacy Pledge, located in [http://studentprivacypledge.org/?page\\_id=45](http://studentprivacypledge.org/?page_id=45);
- i. Ensure that all data processed, stored and maintained by the offeror shall NOT leave the borders of the United States (including all online storage as well as data backups and archived data);
- j. Include a process that allows the State to audit the physical environment where a service is hosted;
- k. Include a process for securing non-public data at rest and non-public data in motion;
- l. Allow access to incident data for investigative purposes;
- m. Allow access to system security and audit logs;
- n. Patch software vulnerabilities routinely or automatically on all servers; and
- o. Encrypt data at motion and at rest.

Tools of the Mind agrees to the following:

- a. Comply with Virginia's Information Technology Security Policy and Standards (<http://www.vita.virginia.gov/library/default.aspx?id=537#securityPSGs>);
- b. Comply with the Family Educational Rights and Privacy Act (FERPA);
- c. Meet cloud security requirements by a certifying body such as Fed-RAMP (<http://cloud.cio.gov/fedramp>), if applicable
- d. Include a product support program for users and administrators;
- e. Be Section 508 compliant ([http://www.vita.virginia.gov/uploadedfiles/vita\\_main\\_public/unmanaged/library/contingencyplanningguideline04\\_18\\_2007.pdf](http://www.vita.virginia.gov/uploadedfiles/vita_main_public/unmanaged/library/contingencyplanningguideline04_18_2007.pdf));
- f. Include a backup and recovery plan that is tested at least annually;
- g. Include an outage plan. Users shall be notified of anticipated and unanticipated outages;
- h. Adhere to the Student Privacy Pledge, located in [http://studentprivacypledge.org/?page\\_id=45](http://studentprivacypledge.org/?page_id=45);
- i. Ensure that all data processed, stored and maintained by the offeror shall NOT leave the borders of the United States (including all online storage as well as data backups and archived data);

- j. Include a process that allows the State to audit the physical environment where a service is hosted;
- k. Include a process for securing non-public data at rest and non-public data in motion;
- l. Allow access to incident data for investigative purposes;
- m. Allow access to system security and audit logs;
- n. Patch software vulnerabilities routinely or automatically on all servers; and
- o. Encrypt data at motion and at rest.



## OFFEROR DATA SHEET

Note: The following information is required as part of your response to this solicitation. Failure to complete and provide this sheet may result in finding your bid nonresponsive.

1. Qualification: The vendor must have the capability and capacity in all respects to satisfy fully all of the contractual requirements.
2. Vendor's Primary Contact:  
Name: Angela Alvis Phone: 360-556-8060
3. Years in Business: Indicate the length of time you have been in business providing this type of good or service:  
22 Years \_\_\_\_\_ Months
4. Vendor Information:  
eVA Vendor ID or DUNS Number: VC0000154740
5. Indicate below a listing of at least three (3) current or recent accounts, school districts or states, for which the same or similar services proposed were provided. Include the length of service and the name, address, email address, and telephone number of the point of contact.
  - Company: Roanoke County Public Schools  
Contact: Sharon Sheppard  
Phone: (540) 540-3900 ext. 10183 Email: ssheppard@rcs.k12.va.us  
Project: Tools of the Mind Preschool/PreK Training Series  
Dates of Service: July 2014-present \$ Value: 139,750
  - Company: District of Columbia Public Schools  
Contact: Sarah Weston  
Phone: (240)271-6438 Email: sarah.weston@dc.gov  
Project: Tools of the Mind Preschool/PreK Training Series; Kindergarten Training Series  
Dates of Service: July 2012-present \$ Value: 1,829,125
  - Company: KIPP DC Grow Academy  
Contact: Lauren Ellis  
Phone: (202) 986-4769 x4019 Email: lauren.ellis@kipfdc.org  
Project: Tools of the Mind Preschool/PreK Training Series  
Dates of Service: 2013-present \$ Value: 43,300
  - Company: \_\_\_\_\_  
Contact: \_\_\_\_\_  
Phone: ( ) Email:

Project: \_\_\_\_\_

Dates of Service: \_\_\_\_\_ \$ Value: \_\_\_\_\_

I certify the accuracy of this information.

Signed: Angela M. Alois Title: Regional Training Manager Date: 7/7/15

## Revised Response Template for Professional Development Offering

Complete and include a separate Attachment D for each Professional Development Offering to be included in your proposal. For each different Professional Development Offering, first enter the name and description and then answer Question 1 below. Based on your response to Question #1 below, insert -I, -II, -III, or -IV in the header above after “Attachment D.” If you have the same delivery method for more than one professional development offering to be included in your proposal, add a number after the Roman numeral indicating the category. For example, if your proposal includes three different professional development offerings that will be delivered face-to-face (in-person), two different professional development offerings that will be delivered via an online interactive format, and one professional development offering that will be delivered via a combination; you will have attachments D-I-1, D-I-2, D-I-3, D-II-1, D-II-2, and D-IV.

Within Tab 6 of your proposal, include separate tabs so that each offering is in a separate tab with the name indicated in the header. For the example above, within Tab 6 include Tabs D-I-1, D-I-2, D-I-3, D-II-1, D-II-2, and D-IV.

### Name of Professional Development Offering

*Tools of the Mind* Preschool/Pre-K Professional Development Series

### Brief (15 to 20 Word) Description

*Tools of the Mind* is a research-based comprehensive early childhood program that builds strong foundations for school success by promoting intentional and self-regulated learning.

1. What method will you use to deliver the professional development? Indicate one and only one delivery method set out below as (I, II, III, or IV) per separate Attachment D. (Also see Attachment E, Pricing Schedule.) Indicate the delivery method I – IV to the right of “Attachment D” in the header above.

Select one and only one:

- ☐ I. In-person (face-to-face)
- ☐ II. Online interactive (e.g., via Webinar)
- ☐ III. Online NOT interactive (e.g. listen or read only)
- ✓ ☐ IV. Combination of live and virtual/online

Briefly describe the approach and why it is appropriate for meeting the learning objectives.



The curriculum is taught in four workshops spread across the year, matching the developmental trajectory of children’s growing skills. This in person workshop format is supplemented by virtual technical assistance in the form of live webinars and support through our innovative app based learning system, the iScaffold. This combination of approaches provides teachers with ongoing support and a range of ways to learn.

You may also select “Other.” (Also see Attachment E, Pricing Schedule.) Professional development offerings using “other” delivery methods may or may not be included in any resulting contract. Briefly describe the approach, why it is appropriate for meeting the learning objectives, the time commitment, and the justification for the time commitment needed to meet the objectives of the professional development opportunity.

☐ V. Other

Insert response here.

Table A. **Check all that apply to this stand-alone product:**

	Professional Development Category
X	a. Quality of teacher-child interactions
X	b. Providing developmentally appropriate preschool learning environments
X	c. Early literacy skills
X	d. Early mathematics skills
X	e. Early scientific development skills
X	f. Promoting preschool children’s critical thinking, problem solving, and other executive functions
X	g. Promoting preschool children’s social and emotional development
X	h. Instructional services and support for students with disabilities
X	i. Instructional services and support for English language learners
X	j. Behavior management techniques for diverse preschool children
X	k. Preschool classroom management techniques
	l. Elementary school leadership development to support and strengthen early learning programs
	m. Communicating with diverse parents of preschool children
	n. Aligning early childhood education programs from birth through third grade or preschool

	Professional Development Category
	to third grade
	o. Family engagement and support services, including comprehensive preschool services, and effective family engagement strategies designed to sustain improved early learning outcomes through third grade

2. Which of the Essential Domains of School Readiness does this stand-alone professional development offering focus on (Check one or more)

- ✓ ☐ Language and literacy development;
- ✓ ☐ Cognition and general knowledge (including early mathematics and early scientific development);
- ✓ ☐ Approaches toward learning (including the utilization of the arts);
- ✓ ☐ Physical well-being and motor development (including adaptive skills); and
- ✓ ☐ Social and emotional development.

3. Who is your target audience? (Check all that apply.)

- ✓ ☐ Teachers
- ✓ ☐ Coaches
- ☐ Administrators
- ✓ ☐ Teacher Assistants
- ☐ Other service providers (specify here: \_\_\_\_\_)
- ☐ Parents and families

4. What is the length of delivery in hours (time required excluding self-study or other assignments)?

#### EXAMPLES

##### Face-to-Face Professional Development

The example "X" below provides the time for professional development delivery for a series of 4 workshops that are 4 hours each and require completion of a 10 hour assignment "on your own."

4 Days  
4 Hours per day  
16 Total (4 x 4)

##### Online Professional Development

The example "Y" below provides the time for professional development delivery for a series of 2 online interactive workshops that are 8 hours per day.

2 Days  
8 Hours per day  
16 Total (2 x 8)

##### Face-to-Face Professional Development

5 days  
6 hours per day  
30 Total Hours for Delivery

##### Online Professional Development

4 days  
1 hour per day  
4 Total Hours for Delivery

5. What are the goals and learning objectives of the professional development offering?

The goals of the professional development offering are to:

- Learn how self-regulation develops in young child
  - Learn how to promote self-regulated learning throughout everyday interactions and curricular activities
  - Implement strategies to help children improve the quality of their make-believe play – critical for self-regulation development
  - Facilitate research-based literacy and math activities that incorporate self-regulatory components
  - Manage the classroom using techniques that maximize time, facilitate productive interactions and increase and maintain student engagement
  - Meet the needs of all learners through teaching practices based on cutting edge research and Vygotskian theory
6. Describe the measurement process you will use to determine whether participants met the learning goals and objectives.

Throughout the in-person Professional Development, there are embedded opportunities for the trainer to check for understanding through self-checks, group discussions, and hands on activities. Additionally, the end of the workshop evaluation includes questions directly related to the learning objectives. The live-interactive online professional development provides opportunities for the trainer to go more in depth with content based on the outcomes of the evaluations. At the close of every webinar participants complete a survey about their understanding of the learning objectives that were contained within the professional development module.

eLearning modules provide internal self-checking to ensure that participants are successful in completing course. Participants can receive a professional development certificate only after successfully completing the course work.

The *Tools of the Mind* teacher's manual contains self-reflection forms that can be used by teachers and coaches as a tool to reflect on implementation and fidelity to the program. These forms provide teachers with a guide to reflect on their own practice and implementation of specific activities and strengthen their understanding of *Tools of the Mind* activities and methods.

7. Describe how this offering is consistent with the definition of high-quality professional development as defined in Section III of the Request for Proposals.

The *Tools of the Mind Curriculum* is being used in a wide range of settings, from large urban school districts to small rural Head Start programs. These programs serve diverse student populations in public, charter, and private schools. *Tools* can be found in classrooms serving special education students, dual language learners, and accelerated learners. Some schools begin using the *Tools of the Mind* curriculum with three-years-olds, and continue using it until their students enter first grade. Other programs choose to utilize *Tools of the Mind* only with preschoolers and/or kindergarteners.

Playful learning in early childhood is a hallmark of *Tools of the Mind*. The leading activity unique to preschool and kindergarten should be a key activity within the children's day. In preschool, the leading activity is mature make-believe play. Additionally, children's learning of cognitive and social-emotional self-regulation or executive function is not limited to specially designed activities; rather, self-regulation components are embedded in various content activities.

Activity content is research-based and designed to meet all state and national standards in literacy and mathematics, and covers all developmental domains. *Tools of the Mind* teaching strategies and learning objectives align with Virginia's preschool learning standards, Virginia's Foundation Blocks, and Virginia's Milestones of Child Development. The knowledge, skills, topics, and concepts that are taught to students in *Tools of the Mind* classrooms meets or exceeds national standards and aligns to Developmentally Appropriate Practice, Kindergarten Common Core State Standards, and The Head Start Child Outcomes Framework.

The literacy practices of *Tools of the Mind* are based on recommendations from the International Reading Association (IRA), the National Association for the Education of Young Children (NAEYC) and the National Early Literacy Panel (NELP) as well as such reviews of the literature as *Preventing Reading Difficulties* and *Eager to Learn*. *Tools of the Mind* addresses the five aspects of literacy defined by the National Reading Panel (NRP): phonemic awareness, phonics, vocabulary, comprehension, and fluency. In addition, the literacy research conducted by Lev Vygotsky's student Daniel Elkonin has been used to inform instruction in phonemic awareness. The instructional strategy of Scaffolded Writing, developed by *Tools of the Mind* researchers, has been successfully used in classrooms across the country and has been described in a number of publications of the International Reading Association. *Tools of the Mind* literacy practices meet state standards and early learning guidelines for kindergarten and preschool and are aligned with Common Core State Standards for kindergarten English Language Arts.

The mathematics practices of *Tools of the Mind* are based on recommendations from the National Council of Teachers of Mathematics (NCTM), the National Association for the Education of Young Children (NAEYC) and the National Research Council's Committee on Early Childhood Mathematics. Activities directly address NCTM's early childhood focal points: number and operations, geometry, measurement, data analysis, and algebra. For preschoolers, special attention is given to the two main areas found in the research to be

particularly important for young children: 1) whole number, operations, and relationships; and 2) geometry, spatial thinking, and measurement. The work of Vygotskian mathematics researchers Vasily Davydov and Leonid Venger have also been used to shape the sequence of skill acquisition and to determine the scope and sequence of activities. *Tools of the Mind* mathematics practices meet state standards and early learning guidelines for kindergarten and preschool and are aligned with Common Core State Standards for kindergarten Mathematics.

The *Tools of the Mind* program covers all developmental domains—cognitive, social-emotional, language, physical, creative arts, and approaches to learning. The program emphasizes the development of underlying skills, such as paying attention, remembering on purpose, logic, reasoning, and symbolic representation, as well as the development of literacy, mathematics, and science concepts and skills.

Instructional strategies used in *Tools of the Mind* are a combination of child-initiated activities, cooperative paired learning, teacher scaffolding and explicit instruction, individualization through multiple levels of scaffolding, and on-going use of assessment data to tailor interactions to meet individual needs.

8. Describe qualifications of the individuals/staff who developed this offering.

Dr. Deborah Leong is professor emerita of Psychology and she taught development and educational psychology for 32 years at Metropolitan State College of Denver. She is the co-founder and Executive Director at *Tools of the Mind*. Dr. Leong has her Ph.D. from Stanford University and her M.Ed. from Harvard University.

Dr. Elena Bodrova is the co-founder and Director of Research at *Tools of the Mind*. Prior to her coming to the United States, she was a senior researcher at the Russian Center for Educational Innovations and the Russian Institute for Preschool Education. Dr. Bodrova received her Ph.D. from the Academy of Pedagogical Sciences, Moscow, Russia, and her M.A. from Moscow State University.

Drs. Leong and Bodrova have written numerous books, articles, and educational videos on Vygotskian Approach to Psychology and the development of play.

9. Describe the qualifications of the individuals/staff who deliver the professional development program and their previous experience providing professional development aimed at strengthening early learning environments for children from economically disadvantaged families.

Angela Alvis is a Regional Training Manager and has been conducting trainings and managing project sites for over 5 years with *Tools of the Mind*. Prior to this she taught in private and public schools and Head Start programs. Alvis holds an M.A.Ed. in Educational Leadership

from California State University. She has experience conducting professional presentations, mentoring first year teachers, managing projects sites with multiple schools and training events, as well as leading teaching and training teams. She has presented at NAEYC and several regional conferences across the country.

All Lead Training Specialists have a Bachelors degree or higher in education or related field and experience in preschool and/or kindergarten classroom teaching. Many trainers also have experience in teaching primary grades. All trainers have experience with the *Tools of the Mind* program, either as teachers or coaches/mentor teachers. Additionally, all trainers have experience with professional writing and/or speaking at a local or national level in the field of early childhood education.

10. Describe the alignment to Virginia's *Foundation Blocks for Early Learning*, *Kindergarten Standards of Learning*, and *Milestones for Child Development*, as applicable. For example, professional development related to behavior management techniques for preschool children would need to align with the Foundation Blocks for Personal and Social Development.

Virginia Foundation Block	<i>Tools of the Mind</i> Curriculum Approach and/or Activities with Explanation
VIRGINIA LITERACY FOUNDATION BLOCK	
LITERACY Foundation Block 1: ORAL LANGUAGE	
The child will develop listening and speaking skills by communicating experiences and ideas orally.	
a) Listen with increasing attention to spoken language, conversations, and texts read aloud.  b) Correctly identify characters, objects, and actions in a text with or without pictures and begin to comment about each.  c) Make predictions about what might happen in a story.  d) Use complete sentences to ask and answer questions about experiences or about what has been read.  e) Use appropriate and expanding language for a variety of purposes, e.g., ask questions, express needs,	<p>All <b>Story Lab</b> activities (<b>Active Listening</b>, <b>Connections</b>, <b>Visualization</b>, <b>Vocabulary</b>, <b>Character Empathy</b>, <b>Story Grammar</b>, and <b>Predictions &amp; Inferences</b>) require children to listen for a purpose as the teacher reads a book (fiction or non-fiction) aloud. Children share their answers with a peer after the story is completed. The teacher reads the book and students pay attention to certain discussion questions and orient their thinking as they listen (<b>Active Listening</b>), activate their background knowledge and make connections (<b>Connections</b>), learn new vocabulary words (<b>Vocabulary</b>), students can visualize themselves in the story (<b>Visualization</b>), students think about feelings by listening to a story and empathizing with the characters (<b>Character Empathy</b>), students answer questions about key concepts of the text including characters, setting and events (<b>Story Grammar</b>) and students learn to predict and infer based on the cues in the text (<b>Predictions &amp; Inferences</b>), students practice learning and remember detailed facts (<b>Learning Facts</b>). Students share their responses with a peer after or during the story, depending on the lab.</p> <p>Throughout the day teachers ask open-ended questions, and children respond using facial expressions, body language, gestures and sign language to engage in reciprocal conversation. <b>Share the News, Buddy</b></p>

<p>get information.</p> <p>f) Engage in turn taking exchanges and rules of polite conversation with adults and peers, understanding that conversation is interactive.</p> <p>g) Listen attentively to stories in a whole class setting.</p> <p>h) Follow simple one- and two-step oral directions.</p>	<p><b>Reading, Story Labs, Science Eyes and Make Believe Play</b> are all designed to encourage children to ask questions to obtain information. For instance, <b>Science Eyes</b> provides students with the opportunity to observe, question and compare the environments in which students live, how things work, and causal relationships. They practice using descriptive language. <b>Share the News, Play Planning, Make Believe Play, Story Lab: Connections and Character Empathy</b> are specifically designed to help children use language for a variety of purposes - to express feelings, to make connections, to initiate play with others and to communicate and negotiate ideas and plans for activities.</p> <p><b>All partner or group activities (e.g. Make Believe Play, Share the News, Buddy Reading, Science Eyes etc.)</b> have been specifically designed to offer opportunities for children to learn to listen and respond appropriately by taking turns and staying on topic through the use of external mediation and specific guidance from the teacher. The scaffolds embedded into <b>Share the News</b> and <b>Buddy Reading</b> support turn taking and ensuring that each child has an opportunity to express herself or himself.</p> <p>In <b>Share the News</b>, the teacher and children read the Share the News Icon Chart together, and the teacher introduces a topic for the day's discussion. Children discuss the topic with a partner. The teacher brings the activity to a close by talking briefly about several of the comments that he/she heard. <b>Physical self-regulation games and songs (Freeze game, movement songs), Attention focusing activities (finger plays, songs, Do What I Do), Pretend transitions and Community Building Activities (Name Game chants)</b> offer opportunities for children to listen for a purpose.</p> <p>All <i>Tools of the Mind</i> activities, including but not limited to: <b>Share the News, Story Labs, Play Planning, Make Believe Play, Buddy reading, Making Collections, Graphics Practice</b> offer opportunities to the children to follow oral directions involving several actions, listen for various purposes, show interest in listening activities by participating and show understanding of listening.</p> <p>During <b>Make Believe Play</b>, which is essentially a shared experience, children have opportunity to participate with others in dramatic play, plan and negotiate roles and set up scenarios. They listen and participate to sustain the flow of the play.</p>
<p style="text-align: center;"><b>LITERACY Foundation Block 2: VOCABULARY</b></p> <p style="text-align: center;">The child will develop an understanding of word meanings through the use of appropriate and expanding vocabulary.</p>	
<p>a) Use size, shape, color, and spatial words to describe people, places, and things.</p>	<p>During <b>Story Lab – Vocabulary</b> the teacher introduces new vocabulary and reads a book to the children, discussing the new words in context and making comparisons to concepts already known. The teacher chooses</p>

<p>b) Listen with increasing understanding to conversations and directions.</p> <p>c) Use expanding vocabulary with increasing frequency and sophistication to express and describe feelings, needs, and ideas.</p> <p>d) Participate in a wide variety of active sensory experiences to build vocabulary.</p>	<p>from the multiple tactics that work best for teaching the word, and considers the support the text and picture provide. The tactics include: description, synonyms, examples and non-examples, visualization, dramatization and application. Children exercise their memory, develop oral language vocabulary, engage in listening comprehension strategies and use the new, more complex, vocabulary words in conversation to describe feelings and ideas.</p> <p><b>Story Lab-Vocabulary</b> and <b>Story Lab-Learning Facts</b> specifically focus on increasing children’s receptive and expressive vocabulary. In addition, <b>Science Eyes</b> and <b>Small Group Math/Science</b> provide children with an opportunity to compare objects, learn to use descriptive words.</p> <p>During <b>Make Believe Play Practice</b> the teachers focus on introducing new vocabulary in the context of the theme which provides opportunities for more active sensory experiences.</p>
<p>LITERACY Foundation Block 3: PHONOLOGICAL AWARENESS</p> <p>The child will manipulate the various units of speech sounds in words.</p>	
<p>a) Identify words that rhyme and generate simple rhymes.</p> <p>b) Identify words within spoken sentences.</p> <p>c) Begin to produce consonant letter sounds in isolation.</p> <p>d) Successfully detect beginning sounds in words.</p> <p>e) Begin to isolate or produce syllables within multisyllable words.</p>	<p>During <b>Play Planning</b> children use drawing and <b>Scaffolded Writing</b> to identify and discriminate sounds of words in messages that the child wants to write ensuring that the child learns to identify and discriminate sounds in words that have contextual meaning. This is scaffolded on an individual one-on-one basis. <b>Mystery Question, Make a Rhyme and Scaffolded Writing – Message of the Day</b> also provide opportunities for children to discriminate between words in language.</p> <p><b>Mystery Question and Make a Rhyme</b> often incorporate onset-rime as a precursor to syllabification. In addition, children are exposed to syllables as they relate to longer or shorter length words during all forms of <b>Scaffolded Writing - Message of the Day, Play Plans, Story Lab-Story Extensions, Story Lab-Learning Facts, Write Along, Science Eyes, and Venger Drawing. Take-Away Sounds</b> develops phonemic awareness and splitting/blending sounds together within words.</p> <p><b>Scaffolded Writing activities (e.g., Message of the Day, Play Plans, Story Lab-Story Extensions, Story Lab-Learning Facts, Write Along)</b> develop phonemic awareness, sound-to-symbol correspondence/ symbol-to-sound correspondence. <b>Elkonin Box Activities I-II</b> and <b>Take Away Sounds</b> develop phonemic awareness and phonemic awareness and splitting/blending sounds together within words. During <b>Mystery Word</b> activities, children learn to match initial sounds in one word to initial sounds in another word, ending sounds to ending sounds and initial sounds in one word to an ending sound in another word.</p>
<p>LITERACY Foundation Block 4: LETTER KNOWLEDGE AND EARLY WORD RECOGNITION</p> <p>The child will demonstrate basic knowledge of the alphabetic principle and understand that the letters in written</p>	



words represent the sounds in spoken words.	
<p>a) Identify and name uppercase and lowercase letters in random order.</p> <p>b) Identify the letter that represents a spoken sound.</p> <p>c) Provide the most common sound for the majority of letters.</p> <p>d) Begin to match uppercase and lowercase letters.</p> <p>e) Read simple/familiar high-frequency words, including child's name.</p> <p>f) Notice letters in familiar everyday context and ask an adult how to spell words, names, or titles.</p>	<p><b>I Have -Who Has Letters game</b> and <b>Mystery Letter</b> work specifically on letter identification. During <b>I Have – Who Has Letters</b>, the letter cards are randomly shuffled and placed in a stack so children are randomly choosing a card when it is their turn. During <b>Play Planning</b> children attempt to write their names and messages on their plans while the teacher scaffolds letter identification within the individual Zone of Proximal development and using the <b>Sound Map</b>, a visual representation of the letters and their sounds.</p> <p><b>All Scaffolded Writing</b> activities (e.g., <b>Message of the Day</b>, <b>Play Plans</b>, <b>Write Along</b>, <b>Story Lab-Story Extensions</b>, <b>Story Lab-Learning Facts</b>, and <b>Science Eyes</b>) provide opportunities to identify and learn about letters and words of interest, including children's names.</p> <p>During <b>Make Believe Play</b>, children see letters and word within a meaningful context, and teachers will scaffold children during prop making to include letters and words as appropriate. For example, children may make a sign for the doctor's office or label the animals' bowls during the Pet-Vet theme.</p>
LITERACY Foundation Block 5: PRINT AND BOOK AWARENESS	
The child will demonstrate knowledge of print concepts and understand the connection between the spoken and written word.	
<p>a) Identify the front and back covers of a book.</p> <p>b) Identify the location of the title and title page of a book.</p> <p>c) Identify where reading begins on a page (first word).</p> <p>d) Follow text with a finger, pointing to each word as it is read from left to right and top to bottom with assistance.</p> <p>e) Distinguish print from pictures.</p> <p>f) Turn pages one at a time from the front to the back of a book.</p>	<p>During <b>Message of the Day</b> the teacher models how to read a written message following words from left to right, top to bottom. In <b>Mystery Question</b> children follow words from left to right, top to bottom. During <b>Play Planning</b> students are encouraged to reread their message from yesterday, while pointing to the words from left to right, top to bottom. With the <b>Story Lab</b> activities, the teacher models how to read a book, tracking print from left to right, top to bottom, and page by page. Additionally, the teacher distinguishes print from pictures. Students are exposed to the front, back, spine of the book and book handling skills.</p> <p>During <b>Buddy Reading</b>, a pair of students "reads" to each other, initially labeling pictures and then retelling the story. They learn to handle books, identify the front cover, back cover, display correct orientation of the book, distinguishing print from pictures, and pretend read.</p>
LITERACY Foundation Block 6: WRITTEN EXPRESSION	
The child will write using a variety of materials and technology to convey thoughts, ideas, and experiences.	
a) Distinguish print from images or	<b>A variety of Scaffolded Writing activities (e.g., Message of the Day,</b>

<p>illustrations.</p> <p>b) Demonstrate use of print to convey meaning.</p> <p>c) Copy or write letters and numbers using various materials.</p> <p>d) Print first name independently.</p> <p>e) Begin to use correct manuscript letter and number formation.</p> <p>f) Copy various words associated with people or objects within the child's environment.</p> <p>g) Use phonetically spelled words to convey messages or tell a story.</p> <p>h) Understands that writing proceeds left to right and top to bottom.</p>	<p><b>Play Plans, Story Lab-Story Extensions, Story Lab-Learning Facts, Write Along, Science Eyes, and Venger Drawing)</b> allow students ample opportunity to 'write.' Through drawing and writing, children distinguish their own print from their illustrations. These <b>Scaffolded Writing</b> activities also provide opportunities for students to develop phonemic awareness, sound-to-symbol correspondence/ symbol-to-sound correspondence. Students first learn the sounds and names of the letters in the alphabet from use during <b>Scaffolded Writing</b> while doing <b>Message of the day</b>, where they also learn that writing proceeds from left to right and top to bottom, and their <b>Play Plans</b>. <b>Play Planning</b> is a daily activity that precedes play whereby the students 'write' their messages (at each child's individual developmental level) as to what they will do in their play centers that day.</p> <p>They use a variety of writing tools throughout the day and write or copy their names on their play plans and other work they have created. Students learn to spell words using the <b>Sound Map</b>, a visual representation of the letters and their sounds. The teacher scaffolds the child's writing with his/her individual Zone of Proximal Development.</p> <p><b>Make Believe Play</b> offers realistic opportunities for children to write. For example, they may create signs, labels, lists etc. to support their play.</p>
VIRGINIA MATHEMATICS FOUNDATION BLOCK	
<p>MATHEMATICS Foundation Block 1: NUMBER AND NUMBER SENSE</p> <p>The child will count with understanding and use numbers to tell how many, describe order, and compare.</p>	
<p>a) Count forward to 20 or more. Count backward from 5.</p> <p>b) Count a group (set/collection) of five to ten objects by touching each object as it is counted and saying the correct number (one-to-one correspondence).</p> <p>c) Count the items in a collection of one to ten items and know the last counting word tells "how many."</p> <p>d) Compare two groups (sets/collections) of matched objects (zero through ten in each set) and describe the groups using the terms more, fewer, or same.</p> <p>e) Use ordinal numbers (first through fifth) when describing the position of objects or groups of</p>	<p><b>Math Activities</b> such as <b>Timeline Calendar, Weather graphing, I Have Who Has Numbers game, Making Collections, Number line Hopscotch, Numerals game, Freeze on Number, and Guess My Number</b> are designed to help students develop one-to-one correspondence, the relationship between numbers and quantities to 10; connect counting and cardinality numeral name and counting fluency, comparing two groups or sets, and the ability to match quantities with numerals.</p> <p><b>Timeline Calendar-</b> Students count the days on a linear calendar, making a specific motion and action. <b>Weather Graphing-</b> Children learn to read a graph by counting the number of stickers placed for each day and estimating what kind of weather has occurred more often. <b>Timeline Calendar and Weather Graphing</b> provide opportunities from counting forward and backward as well as other mathematic skills.</p> <p>In <b>Making Collections</b>, students work in pairs as one child counts out a collection of counters to match the number of objects pictured on a card. The other child checks the accuracy of the first child by placing the objects onto the pictures on the card. If the numbers don't match, the counter goes back to correct his/her mistake. In <b>Number line Hopscotch</b>,</p>

children in a sequence.	<p>students jump from one numbered carpet square to the next in numerical sequence. The teacher then moves the squares so that the students have to identify, find, and jump to the next number in sequence. <b>Numerals game-</b> Students work in pairs, one child counting out a number of objects after selecting a Numeral card and other child checking the accuracy by placing the objects on a Checking sheet. <b>Freeze on Number-</b> It is a subsequent freeze game where the teacher starts the freeze game music and holds up a number card and prompts students to look at the card while they dance. The students dance till the music stops and then hold up the correct number of fingers to represent the number.</p> <p><b>Remember and Replicate:</b> Children remember and replicate sets of play dough forms of different colors, sizes, and shapes that they first watch the teacher make or assemble. Students are asked to label and remember items arranged in different arrays using positional words and ordinal numbers first through fifth.</p>
<p style="text-align: center;"><b>MATHEMATICS Foundation Block 2: COMPUTATION</b></p> <p style="text-align: center;">The child will recognize change in groups (sets/collections) when objects are both added to and taken away from the groups (sets/collections).</p>	
<p>a) Describe changes in groups (sets/ collections) by using more when groups of objects (sets) are combined (added together).</p> <p>b) Describe changes in groups (sets/ collections) by using fewer when groups of objects (sets) are separated (taken away).</p>	<p><b>Math Memory:</b> Children pay close attention to a set of objects and their attributes as they watch their teacher assemble and then hide the set beneath a cloth. Under the cloth the teacher manipulates the objects- adding, subtracting, substituting, or making no change- then lifts the cloth. Children have to identify what is different about the objects using mathematical language such as add, subtract, more etc</p>
<p style="text-align: center;"><b>MATHEMATICS Foundation Block 3: MEASUREMENT</b></p> <p style="text-align: center;">The child will identify and compare the attributes of length, capacity, weight, time, and temperature.</p>	
<p>a) Recognize attributes of length by using the terms longer or shorter when comparing two objects.</p> <p>b) Know the correct names for the standard tools used for telling time and temperature, and for measuring length, capacity, and weight (clocks, calendars, thermometers, rulers, measuring cups, and scales).</p> <p>c) Use the appropriate vocabulary when comparing temperatures, e.g., hot, cold.</p>	<p><b>Attribute game:</b> Children work in small groups and then in pairs to sort objects by different attributes- size (including length), shape, color, and number of sides. The goal of the scaffolds embedded into each activity is to intentionally support students' transition from concrete three-dimensional representations, through two-dimensions and into understanding black line symbolic representations.</p> <p>During <b>Science Eyes</b> and <b>Small Group Science</b>, children experiment with a variety of standard tools used for telling time and temperature; and measuring length, capacity, and weight (clocks, calendars, thermometers, rulers, measuring cups and scales). They use the appropriate vocabulary when comparing temperatures, e.g., hot, cold. <b>Manipulatives and Blocks</b> during small group also provide opportunities to explore and identify measurable attributes of objects, such as length, and weight. <b>Weather</b></p>

<p>d) Use appropriate vocabulary when describing duration of time, e.g., hour, day, week, month, morning, afternoon, and night.</p>	<p><b>graphing</b> offers opportunities to make direct comparisons of length. For instance, on weather graph children may point out, “Sunny is the tallest and rainy is the medium and snowy has zero red dots.”</p> <p>Students develop the concept of time through the <b>Daily Schedule</b> and the <b>Timeline Calendar</b>. The <b>Daily Schedule</b> contains icons reflecting the activities for each day. The teacher models how to use the <b>Daily Schedule</b> to monitor what comes next. Teachers tell students the time of the day as it relates to the <b>Daily Schedule</b>. <i>Tools of the Mind</i> uses a linear <b>Timeline Calendar</b> to visually present days of the week/month. Other than its orientation, the calendar is used much the same as the traditional rectangular grid; students see how days are numbered, pass, and how the months continue from one to the next. When referencing the <b>Timeline Calendar</b> and <b>Daily Schedule</b> children use appropriate vocabulary when describing duration of time, e.g., hour, day, week, month, morning, afternoon, night, day.</p>
<p style="text-align: center;">MATHEMATICS Foundation Block 4: GEOMETRY</p> <p>The child will describe simple geometric shapes (circle, triangle, rectangle, and square) and indicate their position in relation to an individual and to other objects.</p>	
<p>a) Match and sort shapes (circle, triangle, rectangle, and square).</p> <p>b) Describe how shapes are similar and different.</p> <p>c) Recognize and name shapes (circle, triangle, rectangle, and square).</p> <p>d) Describe the position of objects in relation to other objects and themselves using the terms next to, beside, above, below, under, over, top, and bottom.</p>	<p>A variety of small group math and science activities provide the opportunity for students to explore and discuss basic shapes. In <b>Attribute game</b>, children work in small groups and then in pairs to sort objects by different attributes- size, shape, color, and number of sides.</p> <p>Children describe how shapes are similar and different and determine which of two sets of shapes combine to form the “whole” shape provided in <b>Mystery Shape</b>. Children discuss what object or part of an object a geometric shape could compose in <b>Venger Drawing</b> and then represent their idea in a drawing.</p> <p><b>I Have Who Has Shapes</b> is a small group math game that teaches students fluency for identifying shapes.</p> <p>In <b>Remember and Replicate</b>, children remember and replicate sets of play dough forms of different colors, sizes, and shapes that they first watch the teacher make or assemble. Students are asked to label and remember items arranged in different arrays using positional words.</p>
<p style="text-align: center;">MATHEMATICS Foundation Block 5: DATA COLLECTION AND STATISTICS</p> <p>The child will participate in the data gathering process in order to answer questions of interest.</p>	
<p>a) Collect information to answer questions of interest to children.</p> <p>b) Use descriptive language to compare data by identifying which</p>	<p><b>Science Eyes</b> -children closely observe objects and answer questions of interest, asked by teachers and peers. Children are encouraged to represent their “data”/ observations with pictures and drawings and then use descriptive language to share their product with the teacher and peers.</p>

is more, fewer, or the same in object and picture graphs.	<b>Weather graphing</b> demonstrates how weather data can be represented with pictures in a graph.
<p style="text-align: center;"><b>MATHEMATICS Foundation Block 6: PATTERNS AND RELATIONSHIPS</b></p> <p style="text-align: center;">The child will identify simple patterns of concrete objects and use them to recognize relationships.</p>	
<p>a) Sort and classify objects according to one or two attributes (color, size, shape and texture)</p> <p>b) Identify and explore simple patterns, i.e., AB, AB; red, blue, red, blue</p> <p>c) Use patterns to predict relationships between objects, i.e., the blue shape follows the yellow shape, the triangle follows the square</p>	<p><b>Attribute game</b> - children work in small groups and then in pairs to sort objects by one or two different attributes- color, size, shape and texture</p> <p><b>Remember and Replicate</b>, children remember and replicate sets of play dough forms of different colors, sizes, and shapes that they first watch the teacher make or assemble. The purpose is for children to use play dough forms to make arrays and patterns and think about a number. With the</p> <p><b>Mystery Pattern activity</b>, children compare two patterns, identifying the pattern core. They decide whether the patterns are the same or different and place their names below the appropriate answer. Later in the year, children place their names under the shape that comes next.</p> <p><b>Pattern with Manipulatives</b> has children use key cards to arrange manipulatives to match pattern strips. Children work in pairs; one child replicating a pattern, the other child checking and then they switch roles and work with a new pattern strip. <b>Pattern Movement</b> has children act out patterns by translating patterns into actions. It helps children understand the core of the pattern. Movements and patterns become more complicated as the year progresses.</p>
<p style="text-align: center;"><b>VIRGINIA SCIENCE FOUNDATION BLOCK</b></p> <p style="text-align: center;"><b>SCIENCE Foundation Block 1: SCIENTIFIC INVESTIGATION, REASONING, AND LOGIC</b></p> <p style="text-align: center;">The child will make observations, separate objects into groups based on similar properties, use simple investigation tools, develop questions based upon observations using the five senses, and conduct simple scientific investigations.</p>	
<p>a) Use the five senses to explore and investigate the natural world.</p> <p>b) Use simple tools and technology safely to observe and explore different objects and environments.</p> <p>c) Ask questions about the natural world related to observations.</p> <p>d) Make predictions about what will happen next based on previous experiences.</p> <p>e) Conduct simple scientific</p>	<p>In <b>Science Eyes</b>, children use all of their senses to closely observe characteristics of a variety of objects, describe their observations and basic properties using new vocabulary, answer questions of interest asked by teachers and peers and are encouraged to observe similarities and differences between characteristics. The children also record their observations with drawings and writings. For example, while observing a collection of plants, they may use words like big, small, heavy, light, wide or long. <b>Science Eyes</b> extends into Science experiments some of which may be long-term observations.</p>

investigations.	
<p align="center"><b>SCIENCE Foundation Block 2: FORCE, MOTION AND ENERGY</b></p> <p align="center">The child will describe and compare different kinds of motion that objects can make and will describe how simple tools work.</p>	
<p>a) Describe, demonstrate, and compare the motion of common objects in terms of speed and direction, e.g., fast, slow, up, down.</p> <p>b) Describe and demonstrate the effects of common forces (pushes and pulls) on objects.</p> <p>c) Describe the effects magnets have on other objects.</p> <p>d) Investigate and describe the way simple tools work, e.g., a hammer, a wheel, a screwdriver.</p>	<p><b>Science Eyes</b> provides the opportunity for children to closely observe various collections of objects, including magnets. <b>Science Eyes</b> extends into <b>Science Experiments</b> later in the year. These experiments may be long-term observations using the variety of sciences (life, physical, environmental) and utilize multiple senses. Some of the suggested experiments are: Exploring Force: How will different objects react e.g., effects magnets have on other magnets; they stick together or push apart? How do they react? Making sure children discuss what they think might happen and record what did happen.</p> <p>Children may explore simple tools and the way they work during <b>Make Believe Play</b>. For example, during the Community theme they might explore a construction site and the roles and activities of construction workers, while during the Family theme something in the house might be broken, and they need tools to fix it.</p>
<p align="center"><b>SCIENCE Foundation Block 3: MATTER/PHYSICAL PROPERTIES</b></p> <p align="center">The child will develop language to describe physical properties of objects and use the identified properties to sort the objects.</p>	
<p>a) Describe and sort objects by their physical properties, e.g., color, shape, texture, feel, size and weight, position, speed, and phase of matter (solid or liquid).</p> <p>b) Recognize water in its solid and liquid forms.</p> <p>c) Describe the differences between solid and liquid objects.</p> <p>d) Sort objects based on whether they sink or float in water.</p>	<p><b>Science Eyes</b> provides children with the opportunity to observe, compare, and classify a variety of materials e.g., rocks, soil, water, and plants. They describe their observations using descriptive language, identifying colors, shapes, textures, size, weight and position. The teacher scaffolds the development of vocabulary used to describe the observations. The <b>Attribute Game</b> also provides children with the opportunity to sort objects by different attributes- size, shape, color, and number of sides. Non-fiction books on matter are included in those presented during <b>Story Lab- Learning Facts</b>.</p> <p>During <b>Science Eyes</b>, children can experiment with the physical properties of water (solid, liquid, and gas). Children observe, discuss their thoughts with their partners, and document the results through <b>Scaffolded Writing</b>. Later in the year, Science Eyes extends into Science experiments where one of the suggested experiments includes Sink and Float – place a variety of objects in a tub of water, predict, observe, sort and record results.</p>
<p align="center"><b>SCIENCE Foundation Block 4: MATTER/SIMPLE PHYSICAL AND CHEMICAL REACTIONS</b></p> <p align="center">The child will conduct simple science experiments to examine changes in matter when substances are combined.</p>	

<p>a) Predict changes to matter when various substances are to be combined.</p> <p>b) Observe and conduct simple experiments that explore what will happen when substances are combined.</p> <p>c) Observe and record the experiment results and describe what is seen.</p>	<p><b>Science Eyes</b> provides the opportunity for children to closely observe various collections of objects, manipulative and sort, and then describe their observations using new vocabulary. Science Eyes extends into Science experiments later in the year. These experiments may be long-term observations using the variety of sciences (life, physical, environmental) and utilize multiple senses. Children can experiment with the combination of multiple substances, and then observe, discuss their thoughts with their partners, and document the results through drawings and <b>Scaffolded Writing</b>.</p> <p>Some of the suggested experiments in the manual are: Dissolving sugar in water; observing over time for sugar crystals, ice cubes melting in hot water, combining salt and water and observing for salt crystals (salt crystals form as the water evaporates and grow over several days)</p>
<p style="text-align: center;"><b>SCIENCE Foundation Block 5: LIFE PROCESSES</b></p> <p style="text-align: center;">The child will observe and describe the characteristics of living things, compare the growth of a person to the growth of a plant and an animal, and describe the basic needs and the basic life processes of each.</p>	
<p>a) Describe what living things need to live and grow (food, water, and air).</p> <p>b) Identify basic structures for plants and animals (plants-roots, stems, leaves; animals-eyes, mouth, ears, etc.).</p> <p>c) Recognize that many young plants and animals are similar but not identical to their parents and to one another.</p>	<p>During <b>Science Eyes</b> and <b>Small Group Science</b>, children discuss the similarities and differences in the needs of living things and differences between living and non-living things with each other. Teachers help children measure and make graphs to describe their data. They describe their observations using descriptive language. The teacher scaffolds the development of vocabulary used to describe the observations. Teachers use the <b>Story Lab-Learning Facts</b> to expand children's background knowledge and to help children use text-to-text connections as a base for predictions and explanations.</p> <p>In <b>Science Eyes</b>, children closely observe objects, describe their observations using new vocabulary and are encouraged to observe similarities and differences between characteristics. The children also record their observations with drawings and writings. For example, while observing a collection of leaves, they may use words like big, small, wide or long. <b>Science Eyes</b> extends into <b>Science experiments</b> some of which may be long-term observations.</p> <p>Some suggested experiments with Life Science include observing living things and nonliving things and changes in them: Class pet, caterpillars become butterflies, eggs hatch to become ducks or chicks, planting lima or other beans or seeds in soil in containers or on a wet paper towel, observing and recording growth, nature walks observing changes in plant life, animal tracks and sightings, birds and nesting, etc.</p>
<p style="text-align: center;"><b>SCIENCE Foundation Block 6: INTERRELATIONSHIPS IN EARTH/SPACE SYSTEMS</b></p> <p style="text-align: center;">The child will be able to observe and explore major features of the natural world around him/her, both on Earth and in the sky.</p>	

<p>a) Use vocabulary to describe major features of Earth and the sky.</p> <p>b) Identify objects in the sky – moon, stars, sun, and clouds.</p> <p>c) Classify things seen in the night sky and those seen in the day sky.</p> <p>d) Explore and sort objects in the natural environment (sand, pebbles, rocks, leaves, moss, and other artifacts).</p>	<p>During <b>Small Group Science</b>, teachers may use <b>Story Labs such as Learning Facts, Vocabulary and Inferences &amp; Predictions</b> to investigate features and objects on earth and in the sky when they read non-fiction books on these topics.</p> <p>During <b>Science Eyes</b>, children have the opportunity to closely observe, manipulate and sort various collections of objects, including those from the natural environment, and then describe their observations using new vocabulary.</p>
<p>SCIENCE Foundation Block 7: EARTH PATTERNS, CYCLES AND CHANGE</p> <p>The child will identify simple patterns in his/her daily life and identify things that change over time.</p>	
<p>a) Make daily weather observations and use common weather related vocabulary to describe the observations, e.g., sunny, rainy, cloudy, cold, hot, etc.</p> <p>b) Identify how weather affects daily life.</p> <p>c) Describe basic weather safety rules.</p> <p>d) Observe and recognize the characteristics of the four seasons and the changes observed from season to season.</p> <p>e) Observe and classify the shapes and forms of many common natural objects, e.g., rocks, leaves, twigs, clouds, the moon, etc.</p> <p>f) Compare a variety of living things to determine how they change over time (life cycles).</p> <p>g) Describe home and school routines.</p>	<p>During daily <b>Weather Graphing</b>, children observe the weather and compare the weather in a graph using weather related vocabulary. Children discuss weather patterns and changes in the weather. Children also investigate and share ideas about seasons as they compare leaves from autumn and spring during <b>Science Eyes</b>. During <b>Science Eyes</b>, they will also have the opportunity to closely observe, manipulate and sort various collections of objects, including those from the natural environment, and then record their observations with drawing and writing.</p> <p>The teacher and students discuss and identify daily routines and classroom rules during <b>Opening Group</b> the first few weeks of school. A picture schedule visualizes the flow of the daily schedule. Home and School routines are discussed during <b>Share the News</b> and <b>Message of the Day</b> and in the context of <b>Make Believe Play</b> themes such as Family.</p>
<p>SCIENCE Foundation Block 8:RESOURCES</p>	



The child will practice reusing, recycling, and conserving energy on a daily basis.	
a) Identify ways that some things can be conserved. b) Recognize that some things can be reused. c) Recognize that some things can be recycled. d) Understand and use vocabulary such as conserve, recycle, and reuse.	<b>Science Eyes</b> exposes children to concepts of recycling, conservation, the ways energy can be reserved and, respect for the environment. Non-fiction books on recycling, conservation, and respect for the environment are included in those presented during <b>Story Lab</b> . In addition, during <b>Make Believe Play</b> , children engage in play themes that involve conservation and recycling e.g., during the theme Community children can play in the sanitation center and explore with a variety of recycling materials.
VIRGINIA HISTORY AND SOCIAL SCIENCE FOUNDATION BLOCK	
HISTORY AND SOCIAL SCIENCE Foundation Block 1: HISTORY/SIMILARITIES AND DIFFERENCES	
The child will identify ways in which people are alike and different	
a) Recognize ways in which people are alike and different. b) Describe his/her own unique characteristics and those of others. c) Make the connection that he/she is both a member of a family and a member of a classroom community. d) Engage in pretend play to understand self and others. e) Participate in activities and traditions associated with different cultural heritages.	During <b>Story Lab</b> and <b>Buddy Reading</b> , teachers and children learn about people from different places and cultures. In <b>Story Lab-Making Connections</b> , children are asked to make connections between stories and non-fiction books and their own lives and share these ideas with their peers. Children also have opportunities to relate themselves to their peers in <b>Share the News</b> and <b>Make Believe Play</b> . During <b>Share the News</b> and <b>Story Labs</b> children discuss topics related to accomplishments of self and others; talking and making connections between themselves, their families and the larger cultural group.  <b>Make Believe Play</b> themes include roles of children and their families and places in the community, providing opportunities for children to play out the social relationships between the different people in the community and how they interact with and help each other. Teachers create play scenarios to support understanding and exploration of roles within the theme. <b>Make Believe Play</b> also provides opportunities for children to express individuality and cultural diversity. For example, they could be playing Birthday theme and sharing and learning how they celebrate birthdays in their culture. <b>Story Labs- Active Listening and Connections</b> also contribute towards the same.
HISTORY AND SOCIAL SCIENCE Foundation Block 2: HISTORY/CHANGE OVER TIME	
The child will develop an awareness of change over time.	
a) Describe ways children have changed since they were babies. b) Express the difference between past and present using words such	<b>Message of the Day and Play Plans</b> provide opportunities for the class as a whole and for children individually to plan for and articulate their future plans, while <b>Share the News and Story Lab – Connections</b> require children to draw on memories of the past and their present experiences.

<p>as before, after, now, and then.</p> <p>c) Order/sequence events and objects.</p> <p>d) Ask questions about artifacts from everyday life in the past.</p> <p>e) Recount episodes from stories about the past.</p> <p>f) Take on a role from a specific time, use symbols and props, and act out a story/narrative.</p> <p>g) Describe past times based on stories, pictures, visits, songs, and music.</p>	<p>Review of <b>Play Plans</b> from the days prior provide opportunities for children to recognize events that happened in the past, and children also discuss and role play such events during <b>Make Believe Play</b>.</p> <p>During <b>Make Believe Play</b>, children assume roles and play through increasingly complex scenarios, using the props they have made with their peers, to understand how people and their lives can change over time.</p> <p>Students develop the concept of time through the <b>Daily Schedule</b> and the <b>Timeline Calendar</b>. <i>Tools of the Mind</i> uses a linear <b>Timeline Calendar</b> to visually present days of the week/month. Other than its orientation, the calendar is used much the same as the traditional rectangular grid; students see how days are numbered, pass, and how the months continue from one to the next. When referencing the <b>Timeline Calendar and Daily Schedule</b> children use appropriate vocabulary when describing duration of time, e.g., hour, day, week, month, morning, afternoon, night, day.</p> <p>During <b>Share the News</b>- Children are asked to talk to their partners and explore a variety of topics including past times based on stories, pictures, visits, songs and music and they may share artifacts from everyday life as well.</p>
<p>HISTORY AND SOCIAL SCIENCE Foundation Block 3:GEOGRAPHY/LOCATION</p> <p>The child will develop an increased awareness of the physical relationship between and among people and places.</p>	
<p>a) Identify and describe prominent features of the classroom, school, neighborhood, and community.</p> <p>b) Engage in play where one item represents another (miniature vehicles, people, and blocks).</p> <p>c) Make and walk on paths between objects, e.g., from the door to the window.</p> <p>d) Represent objects in the order in which they occur in the environment.</p> <p>e) Experience seeing things from different elevations.</p>	<p>During <b>Make Believe Play</b>, teachers create scenarios that allow children to learn more about who they share their environment with and how to interact with the things and people around them. The <b>Make Believe Play</b> themes provide a way to explore the classroom, school, neighborhood and community. For example, during Restaurant theme, the centers can represent the various restaurants within the community. Children are encouraged to add geographic markers (e.g., street signs) to their play areas to clarify the play scenario. Children can identify and describe the particular theme they are playing during that time of year. Children are encouraged to use both real and symbolic props to support their play during <b>Make Believe Play</b>.</p> <p>During <b>Free Choice Time</b> and <b>Outdoor Play</b> children may make and walk on paths between objects-ex, from the door to the window. Depending on the resources available, children may use climbers during <b>Outdoor Play</b> to experience seeing things from different elevations.</p>
<p>HISTORY AND SOCIAL SCIENCE Foundation block 4: GEOGRAPHY/DESCRIPTIVE WORDS</p> <p>The child will use words to indicate the relative location of objects and people including direction words, comparison words, and attribute words.</p>	
a) Use words to describe features of	As children are developing props to support their <b>Make Believe Play</b>

<p>locations in the environment and man-made structures found in stories and seen in everyday experiences.</p> <p>b) Use direction words (on, under, over, behind, near, far, above, below, toward, and away) one direction at a time.</p> <p>c) Use comparison words (closer, farther away, taller, shorter, higher, lower, alike, different, inside, and outside).</p> <p>d) Use attribute words (hard, soft, rough, and smooth).</p> <p>e) Use labels and symbols for what the child has seen.</p>	<p>themes, they will often describe features of different locations and structures and then create props to reflect them. For example, they may recognize that the restaurant they are creating needs a sign or that the hospital usually has a ramp in front.</p> <p>Many <i>Tools of the Mind</i> Small Group Math and Science activities, such as <b>Math Memory, Remember and Replicate</b> and <b>Science Eyes</b> incorporate the use of directional, positional and relative distance words.</p> <p><b>Science Eyes</b> provides the opportunity for children to closely observe various collections of objects, manipulate and sort, and then describe their observations using new vocabulary e.g., hard, soft, rough and smooth, and drawings and writings. In the <b>Attribute Game</b>, children work in small groups and then in pairs to sort objects by different attributes- size, shape, color, texture, and number of sides.</p>
<p>HISTORY AND SOCIAL SCIENCE Foundation Block 5: ECONOMICS/WORLD OF WORK</p> <p>The child will develop an increased awareness of the types of work people do and the variety of tools people use in their jobs.</p>	
<p>a) Identify pictures of work and name the jobs people do.</p> <p>b) Describe what people do in their community job.</p> <p>c) Match tools to jobs.</p> <p>d) Match job sites to work done.</p> <p>e) Role play the jobs of workers.</p>	<p>During <b>Story Labs</b> and <b>Buddy Reading</b>, teachers and children learn about the community by reading books about the community workers. Teachers are encouraged to invite community members to share their role and contribution with the students. Teachers also plan local field trips to explore the community around the area.</p> <p>Children engage in <b>Make Believe Play</b> themes like ‘Community’ that involves the people and places in the community. Children play out the role of different people and workers in the community and their social relationships, including how they interact and help each other. The children match tools to jobs and job sites to work done as they create props to support their play and extend their scenarios.</p>
<p>HISTORY AND SOCIAL SCIENCE Foundation Block 6: ECONOMICS/MAKING CHOICES AND EARNING MONEY</p> <p>The child will recognize that people make choices because they cannot have everything they want and that people work to earn money to buy the things they want and need.</p>	
<p>a) Identify choices.</p> <p>b) Recognize that everyone has wants and needs.</p> <p>c) Recognize that our basic needs</p>	<p>During <b>Play Planning</b> and <b>Make Believe Play</b> children identify the center they want, what role they will play and what they will do. They are aware they may not get their first choice because other children that choose a center beforehand may leave the next child with limited centers. During <b>Make Believe Play</b> children role play a variety of situations where choices are made and purchasing situations are present. For example,</p>

<p>include food, clothing, and shelter.</p> <p>d) Choose daily tasks.</p> <p>e) Role play purchasing situations where choices are made.</p>	<p>during the restaurant theme, the children who are the customers will likely engage in a scenario in which they need to choose what to order and pay, while the child in the role of the server will need to give them a bill and take their payment. During the Hospital theme, the child in the role of the visitor may need to stop in the “gift shop” to choose a gift for the patient and the child in the role of the clerk will need to take payment.</p>
<p>HISTORY AND SOCIAL SCIENCE Foundation Block 7: CIVICS/CITIZENSHIP</p> <p>The child will participate as a member/citizen of a classroom community.</p>	
<p>a) Cooperate with others in a joint activity.</p> <p>b) Recognize the need for rules to help get along with others.</p> <p>c) Participate in creating rules for the classroom.</p> <p>d) State personal plans for learning center activities.</p> <p>e) Participate in discussing and generating solutions to a class problem.</p> <p>f) Share thoughts and opinions in group settings.</p> <p>g) Demonstrate responsible behaviors in caring for classroom materials.</p> <p>h) Identify the needs of other people by helping them.</p>	<p><i>Tools of the Mind</i> classrooms reflect a sense of community where children are being respectful towards each other. <i>Tools of the Mind</i> activities like <b>Share the News, Play Planning, Make Believe Play, and Story Labs</b> offer opportunities to children to learn to be respectful and responsible for their behavior. For instance, during <b>Play Planning</b>, we use the center choice list as a mediator, and the children are encouraged to follow along the list waiting for their turn. This shows social emotional self-regulation; that they respect the rights of others. During <b>Play Planning</b>, children state their personal plan for <b>Make Believe Play</b> and then record it with drawings and writing.</p> <p><b>All activities</b> and accompanying materials have rules that the children must learn and follow. Each also includes scaffolds to support the internalization of the “rules.” Children are also encouraged to use private speech to help regulate their own behavior, and to use language to resolve conflicts with peers. Teachers and children discuss and write rules together to help the classroom work.</p> <p><b>Share the News</b> offers opportunities to children where they practice labeling and talking about emotions and feelings — the beginning of emotion recognition and emotional regulation. As the year progresses, <b>Share the News</b> grows with the children. Teachers introduce new and more complex topics for discussion including emotions (labeling and talking about them), play themes, social problem solving, reflecting on rules and their meaning, and giving and receiving compliments. For instance, the teacher may introduce a conflict resolution scenario like, “If your friend keeps asking to play with your toy, but you still want to play with it. What will you do?” Or “If you see a friend grabbing a toy from another friend, what will you do?”</p> <p>Since all activities are shared activities, children learn intuitively to attend to their peers’ needs, help each other, and share ideas. Mediators are built into the activities to support sharing, turn-taking and helping (<b>ex. Buddy Reading - lip &amp; ear cards; Making Collections – hand &amp; check cards</b>).</p>

VIRGINIA HEALTH AND PHYSICAL DEVELOPMENT FOUNDATION BLOCK	
HEALTH AND PHYSICAL Foundation Block 1: SKILLED MOVEMENT/LOCOMOTOR SKILLS	
The child will demonstrate motor skills and movement patterns needed to perform a variety of physical activities.	
<i>LOCOMOTOR SKILLS</i>	
<p>a) Demonstrate beginning forms of the locomotor skills of jumping, hopping, and galloping.</p> <p>b) Perform these locomotor skills in response to teacher-led creative dance.</p>	<p><b>Freeze Games, Physical Self-Regulation Activities, and Outdoor Play</b> develop increasing levels of proficiency, control and balance in walking, climbing, running, jumping, hopping, skipping, marching, and galloping. Children also develop the critical cognitive skill of self-regulation. During the <b>Freeze Game</b>, children engage in creative dance until the music stops, and they are asked to freeze.</p>
<i>NON-LOCOMOTOR SKILLS</i>	
<p>a) Maintain a stable static position while practicing  specific balances on different bases of support,  e.g., standing on toes or standing on one foot.</p> <p>b) Maintain balance while performing a controlled spin.</p> <p>c) Maintain balance while walking on a painted line  or a low balance beam that is no more than three inches above the floor.</p> <p>d) Maintain balance while climbing up steps and walking on a horizontal ladder placed on the floor.</p> <p>e) Perform crisscross pattern activities.</p>	<p><b>Physical Self-Regulation Activities, Pretend Transitions, Outdoor Play and Make Believe Play</b> provide opportunities to develop balance, body-in-space awareness, and gross motor control, including physical self-regulation. For example, a physical self-regulation song such as Listen and Move by Greg and Steve helps develop and refine gross-motor skills such as running, jumping, spinning, walking a straight line perform criss-cross patterns, and hopping. In <b>Number Line Hopscotch</b>, children jump from one numbered carpet square to the next in numerical sequence and maintain a stable static position while waiting.</p>
<i>MANIPULATIVE SKILLS</i>	
<p>a) Manipulate a variety of objects during structured and unstructured physical activity settings.</p> <p>b) Manipulate small objects using</p>	<p>Children use a variety of tools to create their props for <b>Make Believe Play. Scaffolded Writing activities (Play Plans, Write Along, Story Lab-Story Extensions, Story Lab-Learning Facts, and Science Eyes)</b> also provide consistent opportunities to strengthen fine motor skills as children practice drawing and representing their own messages with lines</p>

<p>one hand independently, the other hand independently, and both hands working on the same task.</p> <p>c) Demonstrate increasing ability to coordinate throwing, catching, kicking, bouncing, and juggling movements.</p> <p>d) Coordinate eye-hand and eye-foot movements to perform a task.</p>	<p>and letters.</p> <p><b>Puzzles, Manipulatives and Block Play</b>, which is a part of Small Group Math, and Science initially and then a part of <b>Free choice</b>, offers opportunities for children to develop and refine fine-motors skills. Children use of one hand, alternating hands, and/or both hands together to manipulate small objects.</p> <p>In <b>Graphics Practice</b>, children develop fine motor and self-regulation skills while they practice forming graphical marks and shapes they will need for writing. They do this by drawing specific figures on whiteboards, stopping and starting in response to musical cues.</p> <p><b>Outdoor Play, Free choice and Make Believe Play</b> all help promote spatial and coordination skills</p>
<p>HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 2: MOVEMENT PRINCIPLES AND CONCEPTS</p> <p>The child will use the movement concepts of directions, levels, pathways, and effort while performing locomotor (move body from one place to another), non-locomotor (move around axis of body), and manipulative (move in conjunction with object) skills.</p>	
<p>a) Apply knowledge of movement concepts by performing various locomotor movements while changing directions (right, left, up, down, forward, and backward), levels (high, medium, and low), pathways (straight, curved, and zigzag), and effort (fast, slow, hard, and soft).</p> <p>b) Identify fundamental movement patterns such as running and jumping.</p> <p>c) Begin and expand movement vocabulary.</p> <p>d) Perform various locomotor movements demonstrating changes in directions, levels, pathways, effort, and relationships in space while listening to music, or responding to a drum beat, the beat of a tambourine, verbal instruction, or other signals.</p>	<p><b>Physical Self-Regulation Activities, Pretend Transitions, Outdoor Play and Make Believe Play</b> promote balance, body-in-space awareness, and gross motor control, including physical self-regulation and provide opportunities for children to apply their knowledge of movement concepts. For example, during a pretend transition in the Pet-Vet theme, a teacher might ask children to “walk their dog” to the grooming station backwards or while they are crouched down low.</p> <p>Children determine and express the movement (movement vocabulary and patterns) associated with numerals during <b>Number Follow the Leader</b>.</p> <p>During <b>Graphics Practice</b>, children draw to instrumental music. The tempo of the music influences the drawing of the graphical marks and motor movements.</p>
<p>HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 3: PERSONAL FITNESS</p>	

The child will participate in structured and unstructured physical activity designed to achieve a health-enhancing level of physical fitness.	
a) Participate in activities that allow the child to experience and recognize a rise in the heart rate and breathing rate.  b) Participate in activities designed to strengthen major muscle groups.  c) Participate in activities that enhance flexibility.	<b>Physical Self-Regulation Activities and Outdoor Play</b> are activities which encourage children to be active and provide opportunities for a health-enhancing level of physical fitness.
HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 4: RESPONSIBLE BEHAVIORS  The child will demonstrate the ability to cooperate with others and follow safety rules while participating in physical activities.	
a) Demonstrate safe behaviors by participating appropriately during physical activity, accepting feedback, and taking responsibility for behavior when prompted.  b) Share equipment and space, and take turns with help from the teacher.  c) Work well with others.  d) Listen to and follow simple directions.	All activities, including <b>Physical Self-Regulation Activities and Outdoor Play</b> , have rules that the children must learn and follow. Each also includes scaffolds to support the internalization of the “rules.” Children are also encouraged to use private speech to help remember directions.
HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 5: PHYSICALLY ACTIVE LIFESTYLE  The child will participate in physical activity every day and explain why physical activity is good for health.	
a) Identify the activities that they like and dislike.  b) Describe what it means to be physically active and then have the opportunity to actively pursue the activities they have described.  c) Participate in activities geared toward different levels of proficiency.  d) Identify places at home, in the neighborhood, and in the	During <b>Share the News</b> , the topics for discussion may include what kinds of activities the children do, as well as which ones they like and dislike.  Children engage in <b>Physical Self-Regulation Activities and Outdoor Play</b> every day. During <b>Story Lab</b> , teachers may read non-fiction books that describe the elements of a physically active and healthy lifestyle. In <b>Make Believe Play</b> , teachers may also create roles and scenarios specific to their themes so that children can actively explore a physically active lifestyle within context. For example, during the Family theme, the “mom” may be a high school coach who encourages exercise and physical activity. The “mom” and “dad” could also be discussing weekend activities like hiking or playing at the playground instead of watching TV.

community where children can play safely and be physically active.	
<b>HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 6: HEALTH KNOWLEDGE AND SKILLS</b>  The child will identify healthy and unhealthy foods, and simple practices and habits that promote health and prevent illness.	
<i>NUTRITION</i>	
a) Indicate awareness of hunger and fullness.  b) Identify foods and the food groups to which they belong, e.g., vegetables, fruits, dairy, meats, and grains.  c) Distinguish food and beverages on a continuum from more healthy to less healthy.  d) Demonstrate an understanding that eating a variety of fresh fruits and vegetables with lots of different colors helps the body grow and be healthy.	<p><b>Story Labs- Science Eyes</b> – The teacher builds background knowledge by reading books related to the topic or collection of objects under study. For example, the teacher may read, “Where does food come from” by Shelly Rotner. The students work in pairs and closely observe objects using a mediator and use new vocabulary words to describe their observations. Then they use <b>Scaffolded Writing</b> to draw and write, representing details about their observations.</p> <p><b>All Story Labs – Active Listening, Connections and Learning Facts</b> provide opportunities for children to develop awareness of nutritious food choices. <b>Story Lab- Learning Facts</b> The teacher reads a non-fiction book and the students practice learning and remember detailed facts by active listening and sharing it with a peer. Later during the year, the students draw and write an interesting fact with <b>Scaffolded Writing</b>. For example, the teacher may read “Good Enough to Eat: A Kid’s Guide to Food and Nutrition” by Lizzy Rockwell and initiate a conversation about good food choices.</p> <p>Children may also learn about food, food groups and nutrition in the context of their <b>Make Believe Play</b> themes such as when they are deciding what meal to make during the Family theme or what to carry/purchase in the “grocery store” during the community theme and during <b>Meal Times</b>.</p>
<i>HABITS THAT PROMOTE HEALTH AND PREVENT ILLNESS</i>	
a) Demonstrate how to correctly wash hands.  b) Demonstrate covering the mouth or nose when coughing or sneezing.  c) Identify habits that keep us healthy.  d) Explain the importance of rest.  e) Be able to communicate when one is not feeling well.	<p><b>Meal Times, Snack Times, Outdoor Play, Share the News, and Story Lab</b> provide opportunities to learn about and practice self-care. All <b>Story Labs – Active Listening, Connections and Learning Facts</b> provide opportunities for children to become aware of healthy habits. <b>Story Lab- Learning Facts</b> The teacher reads a non-fiction book, and the students practice learning and remembering detailed facts by active listening and sharing it with a peer. Later during the year, the students draw and write an interesting fact using <b>Scaffolded Writing</b>.</p> <p>Teachers model language to be used when one isn’t feeling well during <b>Make Believe Play Practice</b> while engaged in the Hospital and Pet-Vet themes.</p>



HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 7: INFORMATION ACCESS AND USE	
The child will identify trusted adults and begin to learn how to seek reliable health information.	
<p>a) Understand that health care providers can help them when they are not feeling well.</p> <p>b) Identify people they can trust, e.g., police, firefighters, family members, and teachers, and understand they will keep them safe.</p> <p>c) Be able to differentiate between safe and unsafe situations.</p> <p>d) Begin to share feelings and express how they feel.</p>	<p><b>Make Believe Play, Story Labs- Active Listening, Connections and Learning Facts</b> offer opportunities for children to learn about safe practices indoors and out.</p> <p>During the <b>Make Believe Play</b> themes Community and Hospital, teachers and children create play scenarios in which children may investigate safe and unsafe situations, identify the people in the community who can keep them safe and better understand the role of health care providers. Teachers also create scenarios during <b>Make Believe Play</b> that allow children to practice expressing their emotions.</p> <p><b>Share the News</b> provides additional opportunities for children to express their emotions.</p>
HEALTH AND PHYSICAL DEVELOPMENT Foundation Block 8: COMMUNITY HEALTH AND SAFETY	
The child will understand how to make good decisions about simple health issues to promote a safe and healthy community when alone, with family, at school, and in other group settings.	
<p>a) Follow safety rules on the playground with adult assistance and reminders.</p> <p>b) Follow emergency protocols after practicing safety drills, e.g., fire, earthquake, and lockdown drills.</p> <p>c) Demonstrate pedestrian safety and vehicle awareness.</p> <p>d) Understand bicycle/tricycle safety and the importance of wearing a helmet.</p> <p>e) Know how to make an emergency phone call.</p> <p>f) Act safely around pools, ponds, and other water, e.g., oceans, rivers, creeks, ditches, and swamps</p>	<p><b>Make Believe Play, Story Labs- Active Listening, Connections and Learning Facts</b> offer opportunities for children to learn about safe practices indoors and out.</p> <p>Also, during introducing <b>Classroom Rules</b>, the teachers offer scenarios to the children and approximate towards the rules like “Use walking feet” or “Always wear your helmet.” The children are encouraged to talk about these rules during <b>Share the News</b> and share their responses with a peer.</p> <p>In order to develop awareness the theme for <b>Make Believe play</b> can be community workers or the neighborhood and the children can learn more about the contribution of different community workers and play scenarios where they need to call 911 in case of a fire or emergency.</p>

VIRGINIA PERSONAL AND SOCIAL DEVELOPMENT FOUNDATION BLOCK	
PERSONAL AND SOCIAL DEVELOPMENT Foundation Block 1: SELF CONCEPT	
The child will demonstrate self-confidence and self-reflection.	
<p>a) Demonstrate knowledge of personal information including first and last name, gender, age, birthday, parents' names, teacher's name, school name, town or city where they live, and street name.</p> <p>b) Begin to recognize and express own emotions using words rather than actions.</p> <p>c) Recognize self as a unique individual and respect differences of others.</p> <p>d) Develop personal preferences regarding activities and materials.</p> <p>e) Demonstrate self-direction in use of materials.</p> <p>f) Develop increasing independence in school activities throughout the day.</p>	<p>Personal information including first and last name, gender, age, birthday, parents' names, teacher's name, school name, town or city where they live, and street name are introduced and practiced in several <i>Tools of the Mind</i> activities including <b>Timeline Calendar</b> and <b>Make-Believe Play</b>.</p> <p><b>Share the News, Play Planning, Make Believe Play and Character Empathy Story Lab</b> are specifically designed to help children with identifying, labeling and anticipating emotions so that they can gain an understanding of the same. In <b>Share the News</b>, the teacher introduces a topic for the day's discussion and children discuss the topic with a partner. The topics for this activity relate to understanding emotions, emotion recognition and social problem solving. For example, during <b>Share the News</b> the question could be, "What makes you grumpy? How does your face look when you are grumpy?" During <b>Play Planning</b> the teachers help them anticipate emotions by telling them explicitly what to expect, "Remember, you are first today, that means you will be last tomorrow."</p> <p>During <b>Make Believe Play</b> children extend their play by introducing story problems and taking it on an emotional terrain. <b>Story Lab- Character Empathy</b> encourages children to think about feelings by listening to the story and empathizing with the characters — feeling what they feel.</p> <p><b>Buddy Reading, Play Planning, Make Believe Play, Free choice, Story Labs, Science Eyes</b> offer opportunities for children to express individuality and make independent decisions about which materials to use. For example, during <b>Buddy reading</b>, the children may independently choose books from a variety of different book bins depending on their personal preference. During <b>Play Planning</b>, children select the role they would like to play and demonstrate self-direction in use of materials by also telling the teacher what their plan is for their play when they get to the center.</p> <p>Children are encouraged to move through classroom routines and activities with minimal teacher direction and transition easily from one activity to the next. External mediators assist these transitions. For instance, the daily schedule, with picture icons is posted and the children are able to anticipate and prepare for the activities planned for the day. The use of finger plays and/or songs during transitions is also stressed.</p>
PERSONAL AND SOCIAL DEVELOPMENT Foundation Block 2: SELF-REGULATION	
The child will show self-direction and responsibility.	
a) Contribute ideas for classroom	Teachers and children write classroom rules together. During <b>Classroom</b>

<p>rules and routines.</p> <p>b) Follow rules and routines within the learning environment.</p> <p>c) Use classroom materials purposefully and respectfully.</p> <p>d) Manage transitions and adapt to changes in routine.</p> <p>e) Develop positive responses to challenges.</p>	<p><b>Rules</b>, teachers and children discuss and write rules to help the classroom Work, including how to handle classroom materials.</p> <p>In a <i>Tools of the Mind</i> Classroom, with regard to <b>classroom management</b>, there is an emphasis on the positive. Stating what to do and providing clarification and practice on what this means. There is a use of Tactics to teach self-regulation and use of “rules” to manage behavior. If teachers change behavior by getting it started the right way before the activity begins instead of teachers rectifying the behavior after it has happened and reprimanding them. <i>Tools of the Mind</i> teachers have a positive affective tone:</p> <ul style="list-style-type: none"> <li>• We say what to <u>do</u>. “Sit like me” - where we use a teacher as the model or a mediator as a model but not another child. “What we are going to do is to find a spot to sit” (Using the Share the News mediator).</li> <li>• We use finger plays and songs to gather attention and not redirecting behavior. “Everyone do this with me.” “Josh, can you do this like me?”</li> <li>• Provide practice. “We want to sit like this, like me. Are we all doing that? Check yourself.”</li> </ul> <p>This provides a strong framework for socially acceptable behavior.</p> <p>Children are encouraged to move through classroom routines and activities with minimal teacher direction and transition easily from one activity to the next. External mediators assist these transitions. For instance, the daily schedule, with picture icons is posted and the children are able to anticipate and prepare for the activities planned for the day. The use of finger plays and/or songs during transitions is also stressed.</p> <p><b>Share the News, Play Planning, Make Believe Play and Character Empathy Story Lab</b> are specifically designed to help children with social- emotional self-regulation. For example, during <b>Share the News</b> questions related to resolving social conflicts, the children may be asked, “What will you do if your friend was playing with your favorite toy?” The children are also encouraged to think of multiple ways, as there can be more than one answer. During <b>Make Believe Play</b>, teachers may create complex scenarios designed to present the children with challenges so that they can work together in their roles to create positive responses.</p>
<p>PERSONAL AND SOCIAL DEVELOPMENT Foundation Block 3: APPROACHES TO LEARNING</p> <p>The child will show eagerness and persistence as a learner.</p>	
<p>a) Show interest and curiosity in learning new concepts and trying new activities and experiences.</p> <p>b) Demonstrate ability to learn from experiences by applying prior</p>	<p>All curricular activities (e.g., <b>Make Believe Play, Story Lab and Math/Science</b>) are designed to generate enthusiasm and curiosity, and provide opportunities for children to experience new ideas and express their curiosity.</p> <p><i>Tools of the Mind</i> activities are built around certain tactics like external mediation and shared experience that lead to children to strengthen and</p>

<p>knowledge to new situations.</p> <p>c) Increase attention to a task or activity over time.</p> <p>d) Seek and accept help when needed.</p> <p>e) Attempt to complete a task in more than one way before asking for help.</p>	<p>achieve attention and focus. All activities including <b>Make Believe Play, Buddy Reading, Story labs, Making Collections and other Math games, and Science Eyes</b> have embedded external mediation and shared experience that help children to attend to tasks for a set period of time. For instance, the goal of deep engagement in <b>Make Believe Play</b> is gradually achieved through use of role and action props/cards. This shared experience provides a time for voluntary compliance to stay engaged in the play and language interaction with peers and teachers.</p> <p>All activities are designed to involve sharing, either with a partner, small or large group. The scaffolds embedded into each activity help children become and remain actively involved in the activities. These mediators help all children succeed in completing the task such that all can engage in deliberate and appropriate interaction with others--participating, sharing, comforting behaviors toward peers, taking turns, helping, encouraging, and accepting help. As children work together and help each other, they learn when they can solve a problem themselves and when they need an adult's support.</p>
<p>PERSONAL AND SOCIAL DEVELOPMENT Foundation Block 4: INTERACTION WITH OTHERS</p> <p>The child will interact easily with one or more children and with familiar adults.</p>	
<p>a) Initiate and sustain interactions with other children.</p> <p>b) Demonstrate verbal strategies for making a new friend.</p> <p>c) Interact appropriately with other children and familiar adults by cooperating, helping, sharing, and expressing interest.</p> <p>d) Participate successfully in group settings.</p> <p>e) Demonstrate respectful and polite vocabulary.</p> <p>f) Begin to recognize and respond to the needs, rights, and emotions of others.</p>	<p>At the beginning of the year, <b>Community Building</b> activities such as <b>I Have - Who Has Names</b> and <b>Name Games</b> are a primary focus in a <i>Tools of the Mind</i> classroom. Such activities lead to more positive interactions between children as they refer to each other by name, feeling that they are becoming friends. Through the structure of centers and various activities, the aim is that each child be partnered with every child in the class. The goal is building relationships with all classmates to create a warm, cooperative community of learners.</p> <p>All partner or group activities (e.g. <b>Make Believe Play, Share the News, Buddy Reading</b>) have been specifically designed to support positive peer interaction through the use of external mediation and specific guidance (scaffolding) from the teacher. The scaffolds embedded into <b>Share the News and Buddy Reading</b> support turn taking and ensure that each child has an opportunity to express herself or himself. <b>Make Believe Play</b> is designed so children interact with peers, act positively with all of the children and include them in play. We want children to talk to and get to know all of the children in the group. In addition, since all activities are shared experiences, children learn to attend to their peers' needs, help each other, and share ideas.</p> <p>Teachers also scaffold children through their experiences in large group activities, so that they can participate successfully. For example, this may include providing an external mediator to a child who needs support remembering what he/she should be doing during the experience.</p> <p><i>Tools of the Mind</i> classrooms reflect a sense of community where children</p>

	are being respectful towards each other. <i>Tools of the Mind</i> activities like <b>Share the News, Play Planning, Make Believe Play, and Story Labs</b> offer opportunities to children to learn to be respectful and responsible for their behavior. For instance, during play planning, we use the center choice list as a mediator and the children are encouraged to follow along the list waiting for their turn. This shows social emotional self-regulation; that they respect the rights of others.
<p>PERSONAL AND SOCIAL DEVELOPMENT Foundation Block 5: SOCIAL PROBLEM SOLVING</p> <p>The child will learn and use appropriate verbal skills to resolve conflicts with peers and to ask for help when needed.</p>	
<p>a) Express feelings through appropriate gestures, actions, and words.</p> <p>b) Recognize conflicts and seek possible solutions.</p> <p>c) Allow others to take turns.</p> <p>d) Increase the ability to share materials and toys with others over time.</p> <p>e) Include others in play activities.</p>	<p>The <i>Tools of the Mind</i> curriculum supports and stresses social emotional development as a prerequisite for cognitive development and school readiness.</p> <p><b>Share the News, Play Planning, Make Believe Play and Character Empathy Story Lab</b> are specifically designed to help children with identifying, labeling and anticipating emotions so that they can gain an understanding of the same. In <b>Share the News</b>, the teacher introduces a topic for the day's discussion and children discuss the topic with a partner. The topics for this activity relate to understanding emotions, emotion recognition and social problem solving. For example, during <b>Share the News</b> the question could be, "What makes you grumpy? How does your face look when you are grumpy?" During <b>Play Planning</b> the teachers help the children anticipate emotions by telling them explicitly what to expect, "Remember, you are first today, that means you will be last tomorrow."</p> <p>During <b>Make Believe Play</b> children extend their play by introducing story problems and taking it on an emotional terrain. <b>Story Lab- Character Empathy</b> encourages children to think about feelings by listening to the story and empathizing with the characters — feeling what they feel.</p> <p>All activities are designed such that children work together and help each other. Children learn when they can solve a problem themselves and when they need an adult's support. With adult scaffolding, learns to use words to express anger (e.g., "I don't like it when you push me") and to use words to propose solutions to problems (e.g., "I'll play with those, you play with these"). Activities such as <b>Buddy Reading</b> specifically build the capacity to take turns in talking and listening. During <b>Play Planning</b> children are encouraged to negotiate potential conflict before beginning to play (e.g. who is going to wear the princess costume first). When conflicts do arise teachers support students in using language to discuss potential solutions in appropriate ways. <b>Make Believe Play</b> also provides an opportunity for children to resolve social problems within the context of play beyond what they might experience in their daily lives. For example, a play scenario might include a driver getting a flat tire and is late for a delivery. <b>Share the News</b> offers opportunities to practice labeling and talking about emotions and feelings — the beginning of emotion</p>

	<p>recognition and emotional regulation. As the year progresses, <b>Share the News</b> grows with the children. Teachers introduce new and more complex topics for discussion including emotions (labeling and talking about them), play themes, social problem solving, reflecting on the rules and their meanings, and giving and receiving compliments.</p> <p><i>Tools of the Mind</i> activities are based on the tactics of Shared Learning. The activities including <b>Buddy Reading, Play Planning, Make Believe Play and Math Games including Making Collections, Numerals game , I Have- Who Has games, Math Memory, Patterns with Manipulatives, Attribute Game, Tallying</b> all offer opportunities to children to learn to take turns by using external mediation.</p> <p>For instance, in <b>Making Collections</b>, one child with the “Hand” counts out a collection of counters to match the number of objects pictured on a card. The other child with the “Check” checks the accuracy of the first child’s counting by placing the objects onto the pictures on the card, using one-to-one correspondence to determine whether the quantity of the collection is correct. The checker tells the other child when there are too many or too few, and the counter corrects the mistake. Then the children trade roles.</p> <p>All activities are shared activities and children learn to attend to their peers’ needs, help each other, and share. For instance, during <b>Make Believe Play</b> children learn to share props, agree to switch roles to sustain play.</p>
VIRGINIA MUSIC FOUNDATION BLOCK	
MUSIC Foundation Block 1: MUSIC THEORY/LITERACY	
<p>a) Understand the vocabulary of music.</p> <p>b) Understand that written music represents sounds by using notes.</p> <p>c) Understand that composers write music, musicians sing or play instruments, and dancers utilize music elements in expressing dance.</p> <p>d) Identify common musical instruments.</p>	<p>Musical instruments can be utilized and layered during any of the <i>Tools of the Mind</i> <b>Physical self-regulation games and songs</b> (Freeze Games, movement songs), <b>Attention focusing activities</b> (finger plays, songs, Do What I Do), <b>and Community Building Activities</b> (Name Game chants). Music using a variety of instruments, tempos, dynamics, etc. is used as a part of <b>Graphics Practice</b>. Depending on the classroom’s resources musical instruments and rhythm instruments can be incorporated in <b>Pattern Movement, Attention Focusing Activities, and Physical Self-Regulation Games</b>. Suggestions are provided in the manual.</p> <p>The vocabulary of music, the roles of those involved (composer, musician, dancer) and musical instruments can also be incorporated into <b>Make Believe Play</b> as appropriate. For example, during the Community theme, one of the learning areas might be the music store or opera house. Students will assume relevant roles and engage in scenarios during which they are using the vocabulary of music, playing instruments etc.</p>
MUSIC Foundation Block 2: PERFORMANCE	

The child will participate in musical performance on a regular basis.	
<p>a) Demonstrate the difference between singing and speaking.</p> <p>b) Develop the understanding that the child's body and voice are musical instruments.</p> <p>c) Participate in opportunities to use singing voice and musical instruments.</p> <p>d) Practice good manners when participating in musical performance.</p> <p>e) Repeat simple musical patterns using voice, body, and instruments.</p>	<p><b>Physical self-regulation games and songs</b> (Freeze Games, movement songs), <b>Attention focusing activities</b> (finger plays, songs, Do What I Do), and <b>Community Building Activities</b> (Name Game chants) offer opportunities for children to sing a variety of songs with expression, independently and with others.</p> <p>In a <i>Tools of the Mind</i> program, poems, songs and finger plays are used to get students' attention and participation before starting a <i>Tools of the Mind</i> activity and during transitions between activities. Students gradually learn to recite an inventory of these from memory.</p> <p>During all <b>Story Lab</b> activities, children are tasked to listen with a purpose, and <b>Story Lab-Active Listening</b> specifically focuses on developing this skill. Field trips and special school assemblies, etc. are suggested as a part of building play themes in which children practice being an audience. <b>Make Believe Play Practice</b> offers a daily practice for children to become the audience and practice looking, listening and appropriate participation skills.</p>
MUSIC Foundation Block 3: MUSIC HISTORY AND CULTURAL CONTEXT	
The child will develop an appreciation of different styles of music.	
<p>a) Understand that music comes from many different places in the world.</p> <p>b) Understand that music sounds differently depending on who created it and when it was written.</p> <p>c) Develop an appreciation for different types of music.</p>	<p><b>Make Believe Play</b> offers opportunities where children can include a variety of cultural elements and music from various periods in time. An example would be in the theme 'Family,' there can be various music playing to represent different cultures/families. During <b>Story Lab</b> and <b>Buddy Reading</b>, teachers and children can learn about music and dance from different cultures. Teachers also invite community members to share their musical traditions and explain their purpose in their culture.</p> <p><b>Physical Self-Regulation Games, Pretend Transitions, Attention Focusing Activities, and Community Building Activities</b> can also all provide children with opportunities to hear and move to music, and utilize props from various genres and cultures.</p>
MUSIC Foundation Block 4: ANALYSIS, EVALUATION AND CRITIQUE	
The child will investigate how music is used formally and informally, and engage in multiple visual, aural, and hands-on musical experiences by singing, dancing, and using a variety of materials and instruments.	
<p>a) The child will talk about and compare musical patterns and sounds.</p> <p>b) The child will recognize differences and similarities among music styles.</p>	<p><b>Physical self-regulation games and songs</b> (Freeze Games, Pattern Movement, Number Follow the Leader, movement songs), <b>Attention focusing activities</b> (finger plays, songs, Do What I Do), offer opportunities for children to listen to, imitate, and improvise sounds, patterns or songs independently and with others. For example, in <b>Pattern movement</b>, children act out patterns by translating the pattern into actions. Movements and patterns become more and more complicated as the year</p>

<p>c) The child will explore the creation and purpose of music in personal and social life.</p> <p>d) The child will participate in music activities that involve sharing, taking turns, and cooperation.</p> <p>e) The child will identify types of music he/she prefers.</p>	<p>progresses.</p> <p>Teachers also label the various genres of music used in <b>Graphics Practice</b>, which provides children with another opportunity to identify the types of music he/she prefers.</p>
<p>MUSIC Foundation Block 5: AESTHETICS</p> <p>The child will listen and respond to recorded and live music performances</p>	
<p>a) Use the body and motion to express a response to a musical selection.</p> <p>b) Express a response to a musical selection by using available visual arts supplies.</p> <p>c) Use words to describe how a musical selection makes the child feel.</p>	<p>Children listen to and respond to music and movement during the <b>Freeze Game</b> and <b>Graphics Practice</b>. In a <i>Tools of the Mind</i> classroom, visual arts supplies are always available for a child to use to express him/herself. Additionally, teachers are encouraged to select from a wide variety of music for <b>Music and Movement Activities</b>.</p> <p><b>Share the News, Play Planning, Make Believe Play and Character Empathy Story Lab</b> are specifically designed to help children with identifying, labeling and anticipating emotions so that they can gain an understanding of the same. They can then also use those skills when choosing words to describe how a musical selection makes them feel.</p>
<p>VIRGINIA VISUAL ARTS FOUNDATION BLOCK</p>	
<p>VISUAL ARTS Foundation Block 1: VISUAL COMMUNICATION AND PRODUCTION</p> <p>The child will develop an awareness of the mechanics of the visual arts and produce various forms on a regular basis.</p>	
<p>a) Understand that artists create visual arts using many different tools.</p> <p>b) Understand that the visual arts take many forms.</p> <p>c) Use a variety of materials, textures, and tools for producing visual art.</p> <p>d) Develop and use fine motor skills necessary to produce two- and three-dimensional works of art.</p>	<p>A <i>Tools of the Mind</i> classroom provides children with access to a variety of developmentally appropriate art materials (e.g., crayons, paint, clay) and emphasizes open-ended, process oriented activities (e.g., the teacher provides children with watercolor paints, paper, and brushes and encourages them to paint rather than to all make a dinosaur puppet with the same materials).</p> <p>During <b>Free choice</b> or during the <b>Make Believe Play</b> children may be introduced to vocabulary used in the visual arts (e.g., line, color, shape, sculpture, collage). Children learn this through hands-on activities and explorations, instead of during teacher-directed large-group activities.</p> <p>Children use a variety of open-ended tools, textures and materials to create props to support the <b>Make Believe Play</b> Theme. For example, they may make a hair dryer or pepper shaker with a paper tube. For Vygotskians, writing actually begins with drawing. Drawing is considered the direct</p>



	prerequisite to writing. Children begin by symbolically representing their ideas on paper—that is, the drawing of speech happens first. The writing tools, art materials are made available in each center so that the children can represent their experiences and thoughts, and ideas easily. For instance, in order to indicate that the store is closed, a child may just make up a sign and post it. The goal of the scaffolds (i.e., external mediators) embedded into each activity is to intentionally support children's transition from concrete three- dimensional representations, through two- dimensions, and into understanding symbolic representations (e.g., Freeze game, Buddy Reading, Share the News, and Math Games.)
<p align="center"><b>VISUAL ARTS Foundation Block 2: ART HISTORY AND CULTURAL CONTEXT</b></p> <p align="center">The child will develop an understanding of the cultural importance of the visual arts.</p>	
<p>a) Understand that all cultures have art that reflects their experiences and identity.</p> <p>b) Understand that works of art can be a historical record of a certain time period in history.</p> <p>c) Develop an appreciation for the various forms of visual arts.</p>	<p>During <b>Story Labs- Active Listening and Connections</b> children can be exposed to the visual arts from their own communities as well as from different cultures, and introduced to different types of artists (e.g., illustrators, mural artists, sculptors, painters, architects, photographers). These experiences can then be easily incorporated into the <b>Make Believe Play</b> themes.</p>
<p align="center"><b>VISUAL ARTS Foundation Block 3: ANALYSIS, EVALUATION AND CRITIQUE</b></p> <p align="center">The child will respond to the visual arts in a variety of ways using the body and multiple materials.</p>	
<p>a) Use the body to express a response to a work of art.</p> <p>b) Understand that each person responds to and creates works of art in unique ways.</p> <p>c) Use available art supplies to express an individual response to an art form.</p> <p>d) Use words to describe a response or reaction to a visual arts selection.</p> <p>e) The child will identify types of works of art that he/she prefers.</p>	<p><b>Share the News, Play Planning, Make Believe Play and Character Empathy Story Lab</b> are specifically designed to help children with identifying, labeling and anticipating emotions so that they can gain an understanding of the same. They can then also use those skills when choosing words to describe their reaction to a visual arts selection or the types of works that he/she prefers.</p> <p>Visual art supplies are available to children so that they can express themselves and create props to help them express themselves during <b>Make Believe Play</b>.</p>
<p align="center"><b>VISUAL ARTS Foundation Block 4: AESTHETICS</b></p> <p align="center">The child will examine and express different views and experiences through the visual arts.</p>	
a) Understand that the visual arts	The writing tools and art materials are made available in each center so

<p>express feelings, experiences, and cultures.</p> <p>b) Talk about different kinds of art and recognize the idea, theme, or purpose.</p> <p>c) Create specific works of art based on a common theme, concept, or emotion.</p> <p>d) Collect, compare, and use natural objects and objects made by people.</p> <p>e) Understand the purpose of an art museum.</p>	<p>that the children can represent their experiences, thoughts and ideas easily. In addition to these materials, children also use recycled objects and objects they have found in nature to create theme-related props that will serve an intended purpose during their <b>Make Believe Play</b>.</p> <p>Field trips to theme related places are encouraged which might include an art museum during a Community <b>Make-Believe Play Theme</b>. Teachers may also read books during Story Lab to help children understand the many ways that art can be stored, viewed and appreciate – such as an art museum.</p>
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11. Describe any pre-requisites for participation, resources needed (if any), and space requirements (if any) for participation.

Insert response here.

12. Has the proposed professional development offering been subject to rigorous evaluation as defined in Section III of this Request for Proposals?

☐ No

✓ ☐ Yes.

If yes, in the space below, summarize the evaluation methods, the population in which the program has been subject to rigorous evaluation (as defined in this proposal), and provide documentation verifying the results have been subject to an external peer review process by including a copy of the study just after this attachment. (For example, if the Attachment name is D-I-1, within Tab 6 of your proposal, include it after attachment D-I-1).

*Tools of the Mind* has been the subject of numerous research studies, ranging from single district evaluations to multi-site, nation-wide implementations.

**Barnett, W. S., Jung, K., Yarosz, D. J., Thomas, J., Hornbeck, A., Stechuk, R., & Burns, S. (2008).** **Educational effects of the *Tools of the Mind* curriculum: A randomized trial.** *Early Childhood Research Quarterly*, 23(3), 299-313. In a double-randomized design study of preschool (conducted by the NIEER, National Institute for Early Education Research), *Tools of the Mind* was compared to a control group using a

high-quality ECE program with no emphasis on self-regulation. Children in *Tools of the Mind* were found to have higher rates of self-regulation. In addition to student gains, teachers trained in *Tools of the Mind* scored higher in classroom management measures, used classroom time more productively, and had a higher rate of appropriate and cognitively challenging interactions, as measured by the Early Childhood Environmental Rating Scale and the CLASS.

**Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007).** Preschool program improves cognitive control. *Science*, 318, 1387-1388. A follow-up quasi-experimental study, using classrooms from the NIEER study, compared the self-regulation/executive levels of children in *Tools of the Mind* preschool classrooms with a group of matched controls who did not attend *Tools of the Mind*, and found higher levels of executive function/self-regulation, as measured on neurocognitive tests (University of British Columbia Medical School). Student levels of self-regulation were correlated with achievement levels on standardized tests (Woodcock Johnson, Peabody Picture Vocabulary test).

**Bodrova, E., & Leong, D. J. (2001).** Tools of the Mind: A case study of implementing the Vygotskian approach in American early childhood and primary classrooms. (UNESCO Innodata Monographs: Educational Innovations in Action No. 7) Geneva, Switzerland: International Bureau of Education, UNESCO. Two quasi-experimental studies of preschool and kindergarten children found that those in *Tools of the Mind* classrooms outperformed those in non- *Tools of the Mind* classrooms in literacy skills. Both preschool and kindergarten children in *Tools of the Mind* classrooms had higher levels of sound-to-symbol correspondence and better letter recognition. In addition, kindergarten children had better voice-to-print match and were able to write more words outside of a controlled vocabulary taught in a textbook series, and had more accurate spelling and better phonemic encoding of words.

**Imholz, S. & Petrosino, A. (2012).** Teacher observations on the implementation of the Tools of the Mind curriculum in the classroom: Analysis of interviews conducted over a one-year period. *Creative Education*, 3,185-192. A series of structured interviews were conducted with the teachers participating in *Tools of the Mind* professional development. The analysis of these interviews identified common themes, including challenges teachers face while implementing the program and the effectiveness of the program in supporting children's cognitive and social skills. Overall, teachers reported positive effects of *Tools of the Mind* on their students' self-regulation, verbalization skills, and communication, along with a decrease in the number of behavior incidents. At the same time, teachers indicated the need for some changes in administrative practices to support their own professional development and to further improve the impact of *Tools of the Mind*.

If no, is the proposed professional development offering currently undergoing rigorous evaluation, as defined in Section III of this Request for Proposals?

☐ No

☐ Yes.

If yes, in the space below, summarize the evaluation methods and the population in which the program is undergoing rigorous evaluation (as defined in this proposal), when the evaluation will be completed, and if it will be subject to an external peer review process.

Insert response here.

12. How much time will your participants need to commit? (Provide total number of days, hours per day, and the total time frame in months in which participants will be expected to participate, and a justification for the time commitment needed to meet the objectives of the professional development opportunity.) If you are also proposing another delivery method for this professional development offering, describe both delivery methods in your narrative, including any differences in the time commitment required.

Face-to-Face Professional Development

\_\_\_ Days

\_\_\_ Hours per day

\_\_\_ Months to complete

Online Professional Development (whether interactive or not)

\_\_\_ Total Hours

\_\_\_ Minimum time for each segment/lesson

Combination

5 Days of Face-to-Face Professional Development

6 Hours per day of Face-to-Face Professional Development

4 Total Hours Online Professional Development

1 hour Minimum time for each segment/lesson of Online Professional Development

Please describe, including the time participants will need to commit, here.

Included in the *Tools of the Mind* Preschool/Pre-K professional development offering is five (5) full days of in person workshops and access to a live webinar series of four (4) one (1) hour interactive sessions led by certified *Tools of the Mind* trainers in the first year of training. To support continued independent learning of the curriculum, each participant also receives, access to the password protected area of the *Tools of the Mind* website to access materials and other resources, a set of comprehensive Teacher Manuals, and a license and one-year subscription to iScaffold. The iScaffold is an innovative iPad app that provides a range of ways for teachers to learn and implement the curriculum including video of each activity, Quick Start Guides, resources to use with children and timely push notification reminders. It is estimated that most participants will dedicate three hours a month utilizing these resources to deepen their understanding of the theoretical foundation of the program and sharpen their skills when implementing new activities and approaches.

Insert justification for the time commitment needed to meet the objectives of the professional development opportunity here.

*Tools of the Mind* is a research-based comprehensive early childhood program that builds strong foundations for school success by promoting intentional and self-regulated learning in preschool- and kindergarten-aged children. The *Tools of the Mind* curriculum consists of child-initiated, teacher scaffolded and explicit instruction activities have embedded features to support self-regulation development at the same time as building academic skills. Individualization is emphasized through multiple levels of scaffolding and on-going use of assessment data. *Tools of the Mind* is an integrated approach to teaching practices, classroom management and organization to support self-regulation development. Because the curriculum contains so many resources for teachers to use to improve their classroom practice learning to implement the curriculum is a process and requires a time commitment from the part of teachers and administrators.



## Educational effects of the Tools of the Mind curriculum: A randomized trial

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### ABSTRACT

The effectiveness of the *Tools of the Mind (Tools)* curriculum in improving the education of 3- and 4-year-old children was evaluated by means of a randomized trial. The *Tools* curriculum, based on the work of Vygotsky, focuses on the development of self-regulation at the same time as teaching literacy and mathematics skills in a way that is socially mediated by peers and teachers and with a focus on play. The control group experienced an established district-created model described as a “balanced literacy curriculum with themes.” Teachers and students were randomly assigned to either treatment or control classrooms. Children (88 *Tools* and 122 control) were compared on social behavior, language, and literacy growth. The *Tools* curriculum was found to improve classroom quality and children’s executive function as indicated by lower scores on a problem behavior scale. There were indications that *Tools* also improved children’s language development, but these effects were smaller and did not reach conventional levels of statistical significance in multi-level models or after adjustments for multiple comparisons. Our findings indicate that a developmentally appropriate curriculum with a strong emphasis on play can enhance learning and development so as to improve both the social and academic success of young children. Moreover, it is suggested that to the extent child care commonly increases behavior problems this outcome may be reversed through the use of more appropriate curricula that actually enhance self-regulation.

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### 1. Introduction

Most children in the United States now attend public or private preschool programs for 1 or 2 years prior to kindergarten (Barnett & Yarosz, 2004). Public investments in preschool education have largely focused on improving the school success of low-income and other children at high risk of school failure. The federal and state governments now invest considerable sums in such preschool programs, motivated by research demonstrating that preschool programs can contribute to impressive short- and long-term gains in cognitive, language, and social-emotional development (Bowman, Donovan, & Burns, 2001). However, many questions remain about the most effective approaches to educating young children, including curricular questions about the appropriate balance of teaching methods and children’s experiences, and the knowledge and skills that young children should be expected to learn (Zigler & Bishop-Josef, 2006).

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This study investigates the effects on learning and development of the Tools of the Mind (*Tools*) curriculum, with particular emphasis on self-regulation and emergent literacy. *Tools* is based on a socio-cultural perspective pioneered by Vygotsky (1978) that construes child development to be interactive and constructivist in its orientation (Bodrova & Leong, 2001, 2007). Its design is consistent with the principle that success in preschool is best promoted when children experience environments in which they have an opportunity to be active participants in learning and they are challenged and supported in that learning (Krafft & Berk, 1998). While child-centered, *Tools* also emphasizes the teacher's role in guiding and supporting the child's learning. As we explain below, it does not fit neatly into frameworks that classify curricula as teacher-directed or child initiated, child-centered or content-centered, and academic-focused or socialization-focused.

Our research design employs random assignment of both teachers and students to either treatment (*Tools*) or control (a "generic" district-developed curriculum) conditions. Previous quasi-experimental studies of *Tools* led us to expect that this curriculum would change children's classroom experiences in ways that would improve children's learning and development particularly with respect to emergent literacy and self-regulation (Bodrova & Leong, 2001). Self-regulation has been defined in a variety of ways, but self-regulatory capacity encompasses the ability to control one's physical, emotional, and cognitive functioning (Bronson, 2000). Progress in the development of self-regulation is regarded as "one of the really central and significant cognitive developmental hallmarks of the early childhood period" (Flavell, 1977, p. 64). This experiment was conducted in a low-income urban school district with a high proportion of children from low-income and non-English-speaking families. Such children are especially vulnerable to reading failure and other adverse outcomes if they do not receive high quality education in preschool and later in primary school (Bowman et al., 2001; Snow, Burns, & Griffin, 1998).

We have three primary research hypotheses. First, the *Tools* curriculum will lead to higher quality educational experiences for children, and these should be related to specific *Tools*' curricular emphases including the teacher's use of scaffolding. Second, *Tools* will produce larger gains in children's self-regulation and these gains should be evident in teacher reports of behavior problems (Blair, 2002a,b). Third, *Tools* will produce increases in children's cognitive and language development, especially emergent literacy skills, primarily because of elements of the curriculum directly related to literacy and only secondarily because of its emphasis on self-regulation (Diamond, 2007; Duncan et al., 2006). The comparative advantage for *Tools* over the control curriculum is expected to be greater for self-regulation as the control curriculum also emphasizes literacy development.

## 2. Literature review

The history of research on preschool curriculum is at once rich and limited. Debates about the appropriate extent of play, teacher directedness, individualization and other differences in curricular approaches span the entire history of early childhood education in the United States (Nourot, 2004). Among the most hotly debated questions are how much classroom time should be devoted to play, and how and to what extent play should be guided (Singer, Golinkoff, & Hirsh-Pasek, 2006). The nature and content of education to support to development of young children's literacy as a means to better prepare them for learning to read is similarly contentious. In a recent debate, the only point of agreement between Whitehurst (2001) and Elkind (2001) was that there is a lack of rigorous research on the relative effectiveness of preschool curricula that would help to resolve these issues. Few studies of curricula have employed random assignment, and non-experimental studies commonly confound curriculum differences with other preschool program characteristics and characteristics of the children attending the programs (Bowman et al., 2001). The U.S. Department of Education funded seven randomized trials to study preschool curriculum in 2002 and another six in 2003. However, few studies using randomized trials to evaluate the effects of curricula have actually been published in recent years (e.g., Assel, Landry, Swank, & Gunnewig, 2007; Domitrovich, Cortes, & Greenberg, 2007).

Among the more noteworthy studies on curriculum are randomized, small-scaled trials, some dating to the 1960s and 1970s, comparing the effects of well-specified alternative models on children's learning and development with long-term follow-up. These studies compared: Direct Instruction, High/Scope's open framework model, and a traditional unit-based approach (Schweinhart & Weikart, 1997); Montessori, Direct Instruction, DARCEE, and traditional nursery school (Miller & Bizzell, 1983; Miller & Dyer, 1975); Montessori, Direct Instruction, traditional nursery school, and the Community Integrated Program (Karnes, Shwedel, & Williams, 1983); and, Direct Instruction and Mediated Learning (Mills, Cole, Jenkins, & Dale, 2002).

Taken together these studies yielded several conclusions. First, differences in curricular emphases tend to be reflected in immediate differences in children's learning. The Direct Instruction models produced larger gains on achievement tests of subject matter specific content, for example. Second, the differences in cognitive outcomes did not persist more than a few years after leaving the program. Third, there was some evidence that curriculum effects varied with child characteristics, specifically gender and level of ability at program entry. However, these last findings emerge from post hoc analyses rather than tests of hypotheses specified prior to analysis. As these findings did not appear to replicate across studies, these apparent interactions may simply be due to random variation. Finally, differences in curricula also produce differences in social and emotional development. These differences in social and emotional outcomes may be more persistent than differences in cognitive outcomes.

Long-term follow-up of High/Scope's curriculum comparison study has received much attention because it found that the Direct Instruction curriculum produced far worse outcomes for social and emotional development over a long period of time (Schweinhart, Weikart, & Larner, 1986). The children in the Direct Instruction model had less pro-social behavior and



more anti-social behavior. In follow-up at age 23, the Direct Instruction model apparently failed to produce the decreases in crime and delinquency that had been found earlier in the Perry Preschool study, in contrast to the curriculum models that allowed more child-initiated activity (Schweinhart & Weikart, 1997). These results have been hotly contested (Bereiter, 1986; Gersten, 1986; Schweinhart et al., 1986).

Follow-up through age 15 of another randomized trial found no differences in anti-social behavior and delinquency between Direct Instruction and Mediated Learning, which is a more cognitively oriented model with more child initiation (Mills et al., 2002). This study would appear to contradict the conclusion that direct instruction negatively affects social and emotional development. However, comparison of results suggests that neither of the models in this study improved social behavior to the same extent as the High/Scope model, which specifically focuses on social problem solving and planning. Mills et al. (2002) suggest that gender differences across groups might actually account for this finding in the High/Scope study, but analyses demonstrate that this is not the case (Schweinhart & Weikart, 1997).

The Planned Variation Head Start study, in which curriculum comparisons were made on a large scale (6000 children at 37 sites) is another important source of evidence (Datta, McHale, & Mitchell, 1976). Although it did not employ random assignment, this study did introduce new curriculum models with training to increase fidelity of implementation and controlled conditions across models in that all models were implemented within the relatively homogeneous Head Start program. Again, curriculum models were found to produce results consistent with their curricular emphases. Direct Instruction was found to produce the largest achievement gains, and High/Scope's cognitively oriented model produced the largest gains on IQ tests, though none of these relative advantages were sustained as children moved into elementary school.

A similar and even larger study of 20 curriculum models in elementary school, Project Follow Through, was conducted at about the same time as the Planned Variation study. It also found that the Direct Instruction approach produced the largest achievement test gains. However, for these older children the gains appeared to be somewhat more persistent. Moreover, it appeared that the Direct Instruction model also produced more positive effects on some aspects of social and emotional development compared to other models. These results and their interpretation have been subject to considerable dispute (House, Glass, McLean, & Walker, 1978; Mac Iver & Kemper, 2002; St. Pierre, Anderson, Proper, & Stebbins, 1978; Stebbins, St. Pierre, Proper, Anderson, & Cerva, 1977). While not directly applicable to preschool age children, it has helped to fuel the debates about preschool curriculum.

Given this history it is hardly surprising that much of the research on preschool curriculum that followed compared more child-centered to more didactic practices. Most of these studies have investigated the association between natural variation in measured differences or beliefs and practices and children's achievement and social-emotional development (Hirsh-Pasek, Hyson, & Rescorla, 1990; Marcon, 1999, 2002; Stipek, Daniels, Galluzzo, & Millburn, 1992; Stipek, Daniels, Galluzzo, Millburn, & Salmon, 1998; Stipek, Feiler, Daniels, & Millburn, 1995). Some of these studies have suggested that less didactic methods in preschool result in larger long-term achievement gains and others have added to concerns that more didactic practices with a greater emphasis on academic content are less optimal for children's social and emotional development. Concerns regarding social and emotional development have been intensified by studies finding an association between participation in early child care and children's behavior problems (Belsky et al., 2007; Vandell, 2004).

### 3. Description of the Tools of the Mind curriculum

The Tools of the Mind (*Tools*) curriculum was developed by Bodrova and Leong (1996), based on the theories and practical insights on cognitive development of Luria (1966) and Vygotsky (1978), including the promotion of self-regulation through a comprehensive system of activities. Basic principles of the curriculum include: (1) children construct their own knowledge; (2) development cannot be separated from its social context; (3) learning can lead development; and (4) language plays a central role in mental development (Bodrova & Leong, 2007). Guided by these principles, *Tools* has two primary emphases. First, the curriculum focuses on broad foundational skills, including children's abilities to regulate their own social and cognitive behaviors, to attend and to remember on purpose, the use of symbolic representation, and early math skills (Leong & Hensen, 2003). Second, there is at the same time an emphasis on specific literacy prerequisites for reading and writing (e.g., oral language, phonemic awareness, knowledge of letters, and familiarity with the conventions of print) and on specific mathematics pre-requisites (e.g., counting meaningfully, one-to-one correspondence, patterns, numeral recognition, etc.) (Bodrova & Leong, 2007). The activities promoting these literacy and math pre-requisites have a self-regulatory component built into them.

As the name suggests, *Tools* guides teachers' daily practices to support children's acquisition and development of various psychological "tools." Psychological tools are cultural-based, symbolic artifacts, such as symbols, texts, or graphic organizers, that, when internalized, help individuals to master their own psychological functions, including perception, memory, and attention (Kozulin, 2003). The *Tools* curriculum incorporates 40 Vygotsky-inspired activities designed to promote mature dramatic play, encourage the use of self-regulatory private speech, and teach the use of external aids to facilitate attention and memory (Luria, 1965, 1979; Vygotsky, 1962, 1978, 1997). As self-regulation is considered learned behavior, each specific learning activity is designed to teach self-regulation. Play is viewed as the primary source of self-regulation as well as leading children to higher levels of development. Thus, *Tools* teachers do not simply "let" children play, but use a play planning process as well as specific interactions to actively support children's development of "mature" play in which pretend scenarios are complex, planned, sustained, and involve multiple roles. Other defining characteristics of *Tools* are Scaffolded Writing



(Bodrova & Leong, 1995), directions for oral language use between teachers and children, and movement activities that incorporate self-regulation and symbol use.

Dramatic play is a leading mechanism for the development of self-regulation, and *Tools* is similar to other constructivist and play-based curricula in room arrangement, materials, and the balance between small group, large group, and play activities. However, *Tools* differs from other curricular models in that the teacher actively supports the development of mature intentional dramatic play, while ensuring that each child is active in the selection of activities and the creation of the play scenarios (Bodrova & Leong, 2007). In *Tools*, the teacher helps children to write play plans, teaches children to plan their dramatic play together, and helps children to think about next steps during their play with the intention of fostering the development of self-regulation. Dramatic play contributes to the development of children's self-regulation because it is an imaginary situation governed by social rules. While pretending to be a store clerk, the child must seek to behave in ways that meet the social rules for that role, curbing immediate impulses in order to think about how to represent how a clerk would act. Dramatic play leads to the internalization of rules and expectations and places demands and constraints on the child's behavior. In thinking about the role while talking and acting the child is relying on private speech, while play plans provide an external support and children remind each other of the rules and roles thereby helping each other regulate their behavior. In addition, the extensive use of symbols (e.g., pretending a jar lid is the cat's ball) develops abstract thought more generally.

It may be that the strongest difference between the *Tools* curriculum and others is the extent to which it directly addresses the idea that learning traditional academic content can be inefficient or difficult if children lack underlying cognitive skills such as self-regulation, but at the same time, it also can provide a context in which self-regulation can be practiced if it is organized with specific structural features (use of private speech, mediation, and specific teacher/peer interactions). All activities within the curriculum are designed to promote the development of such underlying skills along with more academic subject matter. The sheer number of activities designed to foster self-regulation, as well as the details of those activities (e.g., the development of children's play plans in concert with the teacher through Scaffolded Writing, turn-taking in Buddy Reading facilitated by concrete external aids, and the Pattern Movement game designed to increase the use of private speech and practice its use in self-regulation) distinguishes *Tools*. Finally, even though play is viewed as the leading activity for developing underlying foundational skills, and the curriculum, *Tools* makes more use of direct instruction than many other constructivist curricula.

In *Tools*, the teacher's role is not just to teach skills or facts, but to help children use tools and to learn to develop tools to facilitate learning. One of the tools expressly taught is the use of external mediators to regulate behavior. In "Buddy Reading" children are provided with books and take turns reading to each other (telling the story, turning pages, pointing to pictures, etc.). One child is given a picture of a mouth and the other member of the pair is given a picture of an ear. The child with the mouth picks a book and reads to the other. The child with the ear listens and waits for his or her turn. Then they switch pictures and roles. The pictures help the children to remember their roles and regulate their behavior. Several months into the year, the pictures are no longer necessary as the children move beyond the need for an external reminder.

The "Freeze Game" is another activity specifically designed to develop self-regulation and other abilities. During the Freeze Game, children practice self-regulation and symbolic representation. During circle time, the teacher plays music to which she and the children dance. While dancing the teacher holds a picture of stick figure representing a specific pose that children will take when the music stops. The children must control their own behavior by taking specific actions at specific times. This requires inhibition, not getting into the pose before the music stops, as well as holding the particular pose when the music does stop. By regulating their behavior, dancing and not dancing, posing and not posing, on purpose children developing their ability to regulate emotions and cognition. They are also learning to interpret symbols as they translate an iconic representation of a body position into an actual body position.

#### 4. Description of the control curriculum

The control curriculum was developed by the local school district teachers and administration during the 3 years prior to the study. The curriculum developed by the school district was based on the idea that literacy should be taught to young children in a balanced way (i.e., through a combination of reading, writing, and listening activities) and in the context of thematic units, such as 'family' or 'transportation.' This focus on literacy is a characteristic it shared with *Tools*. In structured observations (discussed below) of the control group, frequently observed activities were art projects that correlated with the "letter of the week," free play for 30–60 min a day, large group movement and music, and other large group activities such as story-time. This curriculum represents common practices in many preschool programs that construct their own curriculum or adopt eclectic practices (Clifford et al., 2005). Although the control curriculum covered much of the same "academic" content and topics as *Tools*, it differed in educational philosophy and it did not weave activities promoting self-regulation throughout the day. In control classrooms, there was greater emphasis on teacher-imposed control and less on children regulating each other and themselves.

#### 5. Method

##### 5.1. Research site

The school selected for this research study is located in an urban school district in New Jersey and is part of the state-financed full-day "Abbott" preschool education program. Abbott programs are open to all children at ages three and four in

31 of New Jersey's high poverty school districts. Median income for families living in the city was \$34,935 according to data from the 2000 U.S. census. Data reported by the district to the state Department of Education indicate that over 80% of the district's public school students qualified for free or reduced price lunch, and 70% came from homes where English is not the primary language.

The structural characteristics of preschool education in all classrooms are set by state regulations. Each classroom must have a teacher with a BA and certification in early childhood education who works together with an aide. Class size is limited to 15 students. Support includes mentor teachers to coach teaching staff. Guidance is provided by detailed state standards for children's learning in the preschool program. All classrooms operate for at least 6 h per day, 180 days per year with wrap-around care offered for an extended day and year to meet the child care needs of parents. The children's school year began right after Labor Day and continued through mid-June. In this district, 3- and 4-year olds were served in mixed age group classrooms.

## 5.2. Participants

District administrators offered the research team seven classrooms on one floor of the school for implementation of the *Tools* curriculum. Eleven classrooms on another floor were available for the control condition. Teachers and assistants were randomly assigned to the classrooms for fall of 2002. The district also provided the investigators with a list of children registered for preschool education ( $n = 274$ ) at the research site, and these children were randomly assigned to classrooms before the start of school, as well.

Given the small number of teachers, random assignment by blocks was used to ensure that treatment was not confounded with key teacher characteristics. Specifically, teachers were stratified into four groups: eight teachers with a preschool-grade three license (P-3); four teachers with a K-8 license who were grandfathered (requires two full years of preschool teaching experience for preschool validation); four teachers with a N-8 license (an older certificate that preceded the P-3); and two teachers transferred from another school within the district (unlike the others, they did not choose to work at this school but were relocated there by the district). Two teachers from each of the first three groups and one teacher from the last were randomly chosen for the *Tools* classrooms.

Efforts were made to control treatment diffusion (Cook & Shadish, 1994) between the two groups of teachers by placing all the treatment classes on one floor of the building and all the control classes on another floor. This restriction of each curriculum to separate floors of the building resulted in unequal numbers of classrooms in the treatment and control groups. The smaller floor was used for *Tools* because it meant lower costs for training and technical assistance from outside the district. In addition, treatment group teachers signed documents in which they pledged not to divulge the practices they were learning to other teachers while the study was underway.

All classrooms looked very similar physically before the *Tools* curriculum intervention. For example, the school district ordered all classrooms exactly the same amount and type of furniture, toys, art supplies and books. Any incidental differences in the classroom materials were due to the teacher bringing in her own supplies from home.

There were a few materials specific to the *Tools* curriculum that were necessary for the curriculum implementation that the school district had not provided (in particular, wipe off boards and erasable markers) or had not provided in sufficient quantity (reams of white paper for daily planning). These materials were purchased for the treatment classrooms by the researchers and an equal amount of money was provided to control group teachers for purchase of similar amounts of educational materials at their discretion (total amount spent was \$300 per class).

A total of 274 three- and four-year-old children were randomly assigned to either *Tools* curriculum classrooms ( $n = 106$ ) or district curriculum classrooms ( $n = 168$ ). At the open house in September two researchers (one native Spanish speaker, one native English speaker) were present to explain the study to parents and answer questions. As an incentive to join the study parents were offered \$20 worth of children's books. Of the group of 274 randomly assigned children, 224 families (82%) consented to have their child participate in testing for the study. Lack of consent was higher for the control group ( $n = 40$ , 24%) than for the *Tools* group ( $n = 10$ , 9%). Teachers were asked to encourage families to return the permission letters, and *Tools* teachers may have been more enthusiastic about the study because they represented the "alternative" to the district's usual curriculum. In addition, three families requested that their children be transferred from *Tools* to the district curriculum and one family requested the reverse, though we do not know the reasons for the transfers. These four children (2% of the sample) did not participate in the study.

Among those who consented to the study, attrition was relatively minor. One child in each group moved out of the district prior to assessment. This left us with an initial sample of 218 children: 92 (42%) in *Tools* and 126 (58%) in the control group. Of these, four in each group were not tested in the Fall, due to the child's absence or discomfort with the testing situation. By Spring post-test, another six children in the *Tools* group and five children in the control group had moved. One child in each group was not tested due to absences so that 85 *Tools* (92%) and 120 control (95%) children were assessed in the Spring.

It was not possible to conduct extensive analyses of attrition, because most attrition in this study was due to lack of active consent from parents prior to any data collection. However, we do know gender, ethnicity, and home language for most of the original sample children. Thus, it was possible to test for differences between those whose parents agreed to participate and those whose parents declined or did not respond. Analysis of Variance revealed no statistically significant main effects of attrition or interactions between attrition and treatment (curriculum assignment).

### 5.3. Teacher training

All the teachers chosen to participate in the study freely agreed to do so and signed informed consent. For their participation, teachers were given a \$100 honorarium plus \$300 worth of educational supplies for their classrooms. The two groups of teachers received similar amounts of in-service training so that differences in this may be ruled out as an explanation for group differences. Teachers who were assigned to *Tools* received 4 full days of curriculum training before classes began in the 2002–2003 school year. Control group teachers attended workshops on the already established district curriculum given by the district for the same amount of time.

During the school year *Tools* teachers received 30 min classroom visits approximately once a week from a *Tools* trainer to address any difficulties they were having with the curriculum. If a teacher expressed a specific concern the *Tools* trainer would then schedule an appointment to come and spend more time in that teacher's classroom. In addition to classroom visits, *Tools* teachers received one half-day workshop and five 1-h lunchtime meetings to discuss aspects of the curriculum.

Control group teachers received similar support in implementing the pre-existing district curriculum from “master teachers.” Master teachers are the district's specialized preschool professional development staff, and they oversee curriculum implementation and assist teachers with improving their teaching, including overcoming any problems they may encounter. During the year the master teachers made periodic visits to each control group teacher and provided a twice-monthly series of after-school or lunchtime workshops on various topics related to the district curriculum.

### 5.4. Fidelity of *Tools* implementation

Full implementation of the *Tools* curriculum requires specific materials and procedures. In addition to more general observation measures discussed later, highly specific fidelity measures were developed to assess the extent to which the study classrooms provided required materials and followed distinctive program procedures. For example, socio-dramatic play is considered to lead cognitive development during the preschool period. Thus, the curriculum calls for the use of toy figures (animal or human) in *each* of the learning centers in the classroom to support children's socio-dramatic play. To assess fidelity of implementation regarding materials, a 50-item “environmental features” observation instrument was developed. The scale measures the presence of materials for seven features: opening activity (circle time); play; equipment; classroom labeling; books; writing; and socio-dramatic play. A criterion of 80% was established as “full” implementation for each feature. Reliability scores of .85–.96 were obtained prior to collecting data from the study classrooms. At the beginning of the year, the *Tools* classrooms fully implemented three of the seven key environmental features. At years end, *Tools* classrooms fully implemented all environmental features except writing. Control classrooms did not fully implement any of the key environmental features at any time.

Assessment of fidelity regarding procedures focused on one particular activity that is common to many curricula, large group morning meeting (circle time). *Tools* sets aside a limited amount of time, 8–10 min, for large group morning meeting and is very specific regarding how it is to be implemented. *Tools* teachers are expected to pose questions to the *group* of children, rather than to specific individuals. Fidelity of implementation in this activity was examined using video tapes of large group meetings collected midyear. We found that on average large group sessions lasted 9 min in *Tools* classrooms and 19 min in control classrooms. This indicated fidelity to the *Tools* model and a clear difference between treatment and control conditions. In addition, *Tools* teachers are expected to pose questions to the entire group simultaneously during rather than to individual children during large group time. Thus, fidelity of teacher–child interaction was assessed by coding the video-taped teacher and child large group time interactions for instances in which teachers posed questions to the group as “group talk” and questions to individual children as “individual talk.” Coders were naïve with respect to the study's focus and which classrooms were in the treatment or control conditions. Reliability scores ranged from .90 to .95. *Tools* teachers, but not control group teachers, were found to direct significantly more “group talk” than “individual talk.”

### 5.5. Description of participating children and families

All children in the sample were age three or four at the time of pre-test administration, and they were 47% females and 53% males. The sample was composed of slightly more 4-year olds (54%) than 3-year olds reflecting overall participation rates in the program. Parent questionnaires were administered at study entry by telephone to obtain more information about the children and their family background including ethnicity, maternal employment, and income. No significant differences were found between *Tools* and control group children on these characteristics or on prior child care attendance, frequency of being read to in the home, and parent-reported knowledge of numbers, letters, and colors. Of those parents responding, 69% reported Spanish as their primary home language, while 30% reported that they use primarily English. The overwhelming majority (93%) described their children as Hispanic or Latino when asked about ethnicity. These statistics are consistent with the composition of the school district as a whole. Table 1 displays the descriptive characteristics of the sample, and compares the groups as initially assigned and as eventually tested.

### 5.6. Child assessment procedures

Children were assessed in the fall (October and November) and spring (late April through early June) of the 2002–2003 school year. Assessments were conducted one-to-one in a quiet section of the child's school environment and were scheduled

**Table 1**  
Characteristics of students by treatment groups

	Total		Treatment		Control		Chi-square <i>p</i>
	<i>n</i>	Percent	<i>n</i>	Percent	<i>n</i>	Percent	
Gender							
Female	129	47.1	49	46.2	80	47.6	.370
Male	145	52.9	57	53.8	88	52.4	
Ethnicity							
Latino/Hispanic	249	92.6	98	92.5	151	92.6	.215
African-American	6	2.2	4	3.8	2	1.2	
Asian	10	3.7	4	3.5	6	3.7	
Multi-racial	4	1.5	0	0	4	2.5	
Primary home language							
Spanish	164	68.9	72	71.3	92	67.2	.489
English	71	29.8	27	26.7	44	32.1	
Another language	3	1.3	2	2.0	1	0.7	

to ensure that they did not disrupt children's school routines (i.e., avoided meals, nap time and outdoor play) seeking to make children as comfortable as possible during the process. Data collectors were graduate students in education and experienced researchers with advanced degrees. They were trained to conduct the child assessments and then shadow scored until they reached 100% agreement with the site coordinator. Throughout the data collection period the site coordinator monitored the testing to ensure administration remained reliable.

Children were tested in Spanish or English. The child's dominant language was ascertained from the classroom teacher who made judgments based on language proficiency tests administered by the schools at the beginning of the year, supplemented by parental report and their own experiences with the children. Assessors spoke to the child only in the language of each assessment to avoid code switching during testing sessions. Bilingual native Spanish speakers were employed to conduct assessments in Spanish.

Children were assessed with six different instruments, split between two testing sessions, to avoid extending the testing time per session beyond 30 min for any child. Children were first assessed with the Woodcock–Johnson Applied Math Problems and Letter–Word Identification Tests, Get Ready to Read, and the Wechsler Preschool Primary Scale of Intelligence Animal Pegs subtest. In the second testing session, we administered the Peabody Picture Vocabulary Test–III (PPVT–III), Expressive One–Word Picture Vocabulary Test (EOWPVT), and the Oral Language Proficiency Test (administered only to Spanish speakers). The Social Skills Rating System (SSRS) was completed by teachers at the end of the school year and did not require the child's participation. Each measure is described below.

### 5.7. Child measures

The PPVT–III was administered to all children regardless of their home language to obtain a measure of standard English vocabulary development. The PPVT–III (Dunn & Dunn, 1997) is a 204-item test of receptive vocabulary in standard English. The test is administered by having children point to one of four pictures shown when given a word to identify. The PPVT–III is often used as a quick indicator of general cognitive ability, and it correlates reasonably well with other measures of linguistic and cognitive development related to school success. The PPVT–III has a mean standard score of 100 and a standard deviation of 15. The PPVT–III was nationally standardized on a stratified normative sample of 2000 children and adolescents and has an internal consistency reported as Spearman–Brown split-half reliability coefficients ranging from .92 to .98. Test–retest reliability for a 1-month interval in four different age groups ranged from .91 to .93.

The Woodcock–Johnson Psycho-Educational Battery–Revised (WJ–R) and the Bateria Psico-Educativa Revisada de Woodcock–Muñoz (WM–R) are comprehensive sets of individually administered tests of cognitive abilities and achievement (Woodcock & Johnson, 1989; Woodcock & Muñoz-Sandoval, 1996). We administered the Letter–Word Identification and Applied Problems subtests from these batteries. The 76-item Letter–Word Identification (Identificación de Letras y Palabras) is a measure of reading decoding, which asks children to identify printed letters and words. The 60-item Applied Problems (Problemas Aplicados) subtest measures math skills.

The WJ–R and WM–R tests were calibrated and equated to U.S. norms through Rasch modeling and are particularly well-suited to the needs of assessment with bilingual populations (Woodcock & Muñoz-Sandoval, 1996). The tests' standard scores have a mean of 100 and a standard deviation of 15. The English Form of the subtests was normed on a stratified random sample of 6359 English-speaking subjects in the United States. The Spanish Form was normed on 3911 primarily monolingual Spanish-speaking subjects from samples obtained both inside and outside the United States. Internal consistency reliabilities range from the high .70s to low .90s on both subtests for preschool-aged children. Correlations of the WJ–R and WM–R with other tests of cognitive ability and achievement are reported to range from .60 to .70.

Get Ready to Read (GRTR) was developed as a screening tool to assess a 4-year-old's progress in developing early literacy skills (Whitehurst & Lonigan, 2001). It was developed using a sample of 342 children from two different locations, ages 48–59

months. GRTR has reported internal consistency (alpha coefficient) of .78 and split-half reliability of .80. This tool has been found to correlate with other measures of language and letter knowledge (Whitehurst & Lonigan, 2001).

The Wechsler Preschool Primary scale of Intelligence Animal Pegs subtest (WPPSI) measures a child's nonverbal problem solving and visual-motor proficiency, particularly accuracy, concentration and speed of performance as they place pegs of correct colors in a series of holes under pictures of animals (Wechsler, 1989). The WPPSI performance IQ has adequate test–retest reliability (.87) and internal consistency reliabilities (.92). Studies have established adequate construct, concurrent, and predictive validity for diverse populations (Wechsler, 1989).

The EOWPVT-Revised is a norm-referenced assessment of expressive vocabulary in standard English designed for use from ages 2 through 18 (Brownell, 2000). The measure taps a child's ability to use words, requiring a child to access and retrieve words from memory, going beyond tests of receptive vocabulary. Normed on a randomly selected sample of 2327 children, the internal consistency of the EOWPVT is .98. To obtain a baseline of standard English expressive vocabulary, this assessment was administered to all children regardless of their home language.

The IDEA Oral Language Proficiency Test (OLPT) assesses the receptive and expressive language skills of Spanish-speaking children (Ballard & Tighe, 1999). Thus, it was administered to about 70% of the students in our sample to assess their Spanish language development. Scores reflect students' responses to items representative of common Spanish language speech patterns. The internal consistency reliability of the measure (Chronbach's alpha) is .97, and test–retest reliability is reported as .63 (Ballard & Tighe, 1999).

The teacher form of the Problem Behaviors Scale of the SSRS was completed by the child's teacher near the end of the school year (Gresham & Elliot, 1990). The SSRS was standardized on a nationally representative sample of 4170 children. The Problem Behavior Scale measures both externalizing and internalizing behaviors. Teacher forms were particularly reliable with an internal consistency coefficient and test–retest correlations ranging from .82 to .95.

### 5.8. Classroom assessment procedures

To assess the extent to which the *Tools* curriculum created the expected changes in children's experiences beyond those documented by the treatment fidelity measures, multiple instruments were used to examine various aspects of the classroom environment. These instruments are described individually in the next section of the paper. Our research team conducted training on the three observation instruments that were administered and scored by our staff. Observers typically had advanced degrees and experience teaching at the preschool level. Each observer was shadow scored and reached an 85% inter-rater reliability rate before qualifying to conduct observations for the study. Each classroom was observed once early in the second semester. The fourth instrument was coded and analyzed by the developers based on classroom video tapes.

Our team video-taped classrooms and another team that was completely blind to treatment or control status coded the video tapes using for the Classroom Assessment Scoring System (CLASS) (Pianta et al., 2005). Video was taken of an entire morning in each class. The data collector who shot the video was instructed to focus on the head teacher and her interactions with the class from breakfast until lunch. During free play, the data collector maintained her focus on the head teacher and her interactions with individual children by moving around the room as needed. In almost all cases the data collector was able to capture the teacher having opening group, playtime, large group and some sort of small group experience. All video was then shipped to the instrument's authors for coding and scoring.

### 5.9. Classroom measures

The Early Childhood Environmental Rating Scale-Revised (ECERS-R) provides a global look at classroom quality with 43 indicators ranging from safety, teacher–child interaction to parent involvement (Harms, Clifford, & Cryer, 1998). The ECERS-R has been used as a tool to measure preschool classroom quality in numerous studies within the United States and abroad (Harms et al., 1998). The ECERS-R scale uses a scoring system where one is considered inadequate quality, three is minimal quality, five is good quality and seven is excellent quality. In the standardization process of this measure, an extensive set of field tests of the ECERS-R was conducted in 45 classrooms. Substantial revisions were made to the first field-test draft of the scale, and then followed by a second test of 21 classrooms which focused on inter-rater reliability. The total scale internal consistency for ECERS-R is .92, and subscale internal consistencies range from .71 to .88.

The Supports for Early Literacy Assessment (SELA) was used to examine the quality of the literacy environment and instruction (Smith, Davidson, Weisenfeld, & Katsaros, 2001). The SELA was developed based on research and professional opinion regarding best practices with regard to the development of young children's literacy. Scores on the SELA range from one through five, with one considered very low quality, three fair or mediocre quality, and five ideal quality.

The Preschool Classroom Implementation (PCI) rating scale (Frede, 1989) measures the frequency of use of scaffolding techniques by teachers in their interactions with children. Items are scored according to teachers' typical behavior throughout the day, with justification for each rating including examples noted by the assessor. Scores on the scale range from one (indicating that the technique was not observed) to five (indicating that the technique was used consistently throughout the day). Examples of items include: "Staff extend children's activities and problem solving by playing alongside children for a few minutes to model new possibilities;" and, "Adults make specific comments that extend children's thinking and focus on cognitive concepts such as classification, seriation, time, and space." The scale employed here is a shortened version of a more comprehensive instrument. The full instrument has been found to predict the effects of preschool education on



children's learning into first grade (Frede, Austin, & Lindauer, 1993; Frede & Barnett, 1992). Analyses of the subscale used in this study found that it correlated with the ECERS-R at .6 ( $p < .001$ ). Inter-rater reliability exceeded 80% and Cronbach's alpha was .89.

The CLASS measures emotional climate, classroom management, and instruction (Pianta et al., 2005). Unlike the ECERS-R, the CLASS does not assess physical or structural features of the classroom. Among the dimensions scored are the sensitivity of teacher behavior to the children, behavior management, effectiveness of behavior management, productive management of time and activities, and the quality of instruction and feedback, and the extent to which activities stimulate conceptual development and engagement (LaParo, Pianta, & Stuhlman, 2004). Each item within the instrument is rated on a seven-point Likert-type scale. The coding and analyses for the CLASS instrument was done by the instrument developers who were blind to treatment or control status of the classrooms in the video tapes.

## 6. Results

We present results in two parts. The first reports findings from analyses of ratings of observed classroom activities and environment, including the estimated effects of curriculum. The second reports estimated effects of the *Tools* curriculum model on children's learning and development. In the statistical analyses, *Tools* is coded 1 and the control condition is coded 0.

### 6.1. Analyses of classroom observation data

Table 2 presents the results of comparisons of the *Tools* and control classrooms on three observation instruments: the ECERS-R, SELA, and PCI. The *Tools* classrooms scored substantially higher than control classrooms on total scores for all three measures: 3.9 versus 3.1 on the ECERS-R, 3.0 versus 2.0 on the SELA, and 2.5 versus 1.6 on the PCI. All of these differences are highly statistically significant ( $p < .01$ ). These differences correspond to effect sizes of about 2. Having found differences on the total scores, we then conducted analyses on the ECERS-R subscales to look for more specific areas of differences. The *Tools* classrooms scored significantly higher on the three ECERS-R subscales most closely related to curriculum: Language and Reasoning ( $p = .01$ ), Activities ( $p = .004$ ), and Interactions ( $p = .08$ ). *Tools* classrooms reached or exceeded an average score of five on both the Language–Reasoning and Interactions subscales.

As there is no summary score for the CLASS, we conducted a factor analysis on the CLASS subscales. This yielded only one factor that loaded on multiple items, which were positive classroom climate, teacher sensitivity, behavior management techniques, and productivity. As the statistical power to detect even large differences is quite limited (data were collected from only 16 classrooms on this measure), we note differences that are significant at the .10 level, but not at the conventional .05 level (two-tailed). A *t*-test suggests a possible difference between the curricula on the CLASS factor ( $p = .096$ ). Comparisons on individual items found the *Tools* classrooms to score significantly higher than the control classrooms on the productivity item ( $p = .04$ ), with indications of a possible difference on the teacher sensitivity item ( $p = .07$ ). Productivity measures teacher management of instructional time and routines, and teacher sensitivity measures responsiveness of the teacher to children's academic and emotional needs and the degree to which the teacher provides a secure base for children to volunteer answers and responses (Table 3).

### 6.2. Analyses of child assessment data

Two-sample *t*-tests presented in Table 4 reveal that there were no significant differences at the beginning of the study year on any of the assessments of children's learning and development. This is consistent with the lack of any family background differences between *Tools* and control groups noted earlier. This provides reassurance that randomization worked to ensure comparability of groups despite attrition.

**Table 2**  
Comparisons of treatment (*Tools*) and control Classrooms on ECERS-R, SELA, PCI

	Treatment, $n = 7$		Control, $n = 11$		$p^a$
	<i>M</i>	S.D.	<i>M</i>	S.D.	
Overall ECERS score	3.9	0.3	3.1	0.5	.003
Space and furnishings	3.4	0.5	3.0	0.7	.248
Personal care subscale	3.6	1.2	2.7	1.1	.132
Language–Reasoning	5.0	0.9	3.4	1.3	.010
Activities	3.7	0.7	2.7	0.7	.004
Interactions	5.7	0.9	4.5	1.7	.081
Program	2.0	0.7	2.2	0.3	.427
Parents and staff	3.7	0.3	3.5	0.5	.232
Overall SELA score	3.0	0.5	2.0	0.5	.001
Overall PCI score	2.5	0.6	1.6	0.4	.002

ECERS, the Early Childhood Environmental Rating Scale-Revised; SELA, Supports for Early Literacy Assessment; PCI, Preschool Classroom Implementation.

<sup>a</sup> Two-tailed *t*-test.

**Table 3**

Comparison of treatment (Tools) and control classrooms on the CLASS

	Treatment, <i>n</i> = 7		Control, <i>n</i> = 9		<i>p</i> <sup>a</sup>
	<i>M</i>	S.D.	<i>M</i>	S.D.	
Positive classroom climate	5.6	1.1	4.8	1.2	.201
Negative classroom climate	1.6	0.5	1.9	1.3	.547
Teacher sensitivity to children	5.4	1.1	4.3	1.1	.074
Over controlling environment	1.7	0.5	1.6	0.5	.547
Behavior management techniques	5.4	1.0	4.6	1.7	.240
Productivity	6.1	0.7	5.1	1.1	.042
Concept development	2.6	1.1	2.3	0.5	.580
Learning formats/engagement of children	5.0	1.3	5.4	0.7	.436
Quality of teacher feedback	2.7	1.1	2.1	0.9	.256

<sup>a</sup> Two-tailed *t*-test.**Table 4**

Comparisons of pre-test scores by treatment group (Tools versus control)

	Treatment (Tools)			Control			<i>p</i> <sup>a</sup>
	<i>n</i>	<i>M</i>	S.D.	<i>n</i>	<i>M</i>	S.D.	
PPVT-III	88	63.8	20.8	122	67.0	15.8	.211
EOWPVT-R	88	63.6	13.4	120	64.0	12.4	.813
WJ-R AP	88	75.7	16.4	122	76.9	14.9	.565
WJ-R LW	88	89.0	11.6	122	88.7	10.1	.832
WIPPSI (raw score)	87	23.0	15.4	122	20.7	14.6	.276
OLPT (raw score)	59	7.3	5.4	82	7.1	5.6	.813

PPVT-III, Peabody Picture Vocabulary Test; EOWPVT-R, Expressive One-Word Picture Vocabulary Test-Revised; WJ-R AP, Woodcock–Johnson Applied Problems; WJ-R LW, Woodcock–Johnson Letter–Word Identification; WIPPSI, Wechsler Preschool Primary Scale of Intelligence Animal Pegs subtest; OLPT, IDEA Oral Language Proficiency Test.

<sup>a</sup> Two-tailed *t*-test.

Two sets of analyses were conducted on child outcomes. Each has its strengths and limitations. Effects on child outcomes were estimated through regression analysis with post-test as the dependent variable and pre-test, curriculum, and the child's primary language as independent variables. Standard scores were employed in the analyses when available. All standardized measures employed have a mean of 100 and a standard deviation of 15. Standard scores are not available for GRTR, the WPPSI Animal Pegs subtest, and the OLPT. Hence, raw scores were used in those regressions, and age was added as an independent variable (no significant interactions were found between treatment and age). The SSRS and GRTR were administered only at post-test. Tables 5 and 6 report the results of regression analyses conducted to estimate curriculum effects on children's learning and development. Statistically significant effects of curriculum were found on the SSRS and on the PPVT-III and OLPT. The effect on behavior problems as measured by the SSRS is about half a standard deviation ( $es = .47$ , Glass' delta). This indicates that behavior problems (as rated by the teacher) were substantially less common for children in the *Tools* classrooms than for those in the control classrooms. In further analyses, reductions in both externalizing and internalizing problems were found to contribute to this effect. The two effects on language development are of moderate size. Estimated effect sizes are .22 for the PPVT-III and .35 for the OLPT. Those estimated effects indicate that *Tools* was more effective than the control curriculum in promoting both English and Spanish language development.

Given the multi-level nature of the data, we also estimated hierarchical linear models with treatment at the classroom level. These analyses are more conservative as they recognize that children are clustered within classrooms. Both methods

**Table 5**

Regressions estimating effects of tools on learning and development (standard score measures)

	SSRS		PPVT-III		EOWPVT-R		WJ-R AP		WJ-R LW	
	<i>B</i>	S.E.	<i>B</i>	S.E.	<i>B</i>	S.E.	<i>B</i>	S.E.	<i>B</i>	S.E.
Constant (intercept)	120.9*	7.43	31.59*	3.56	11.31*	2.81	35.41*	5.40	35.97*	6.30
<i>Tools</i> versus control	−7.31*	1.92	3.72*	1.79	1.39	1.06	2.80	2.10	−1.26	1.45
Pre-test score			0.60*	0.05	0.86*	0.04	0.590*	0.07	0.63*	0.07
Primary language (English = 1, other = 0)			6.51*	1.99						
Age	−0.38*	0.13								
Model <i>R</i> <sup>2</sup>	0.109		0.474		0.670		0.267		0.277	
<i>n</i>	198		209		204		213		213	
Effect size	−.47		.22		.11		.15		−.10	

PPVT-III, Peabody Picture Vocabulary Test; EOWPVT-R, Expressive One-Word Picture Vocabulary Test-Revised; WJ-R AP, Woodcock–Johnson Applied Problems; WJ-R LW, Woodcock–Johnson Letter–Word Identification; SSRS, Problem Behaviors Scale of the Social Skills Rating System.

\*  $p < .05$ .

**Table 6**

Regressions estimating effects of tools on learning and development (raw score measures)

	GRTR		WIPPSI		OLPT	
	B	S.E.	B	S.E.	B	S.E.
Constant (intercept)	−3.61 <sup>*</sup>	1.87	−14.37 <sup>*</sup>	6.70	−14.32 <sup>*</sup>	3.86
Tools versus control	0.19	0.49	1.02	1.63	2.27 <sup>*</sup>	1.00
Pre-test score			0.53 <sup>*</sup>	0.06	0.61 <sup>*</sup>	0.10
Age	0.23 <sup>*</sup>	0.03	0.64 <sup>*</sup>	0.13	0.35 <sup>*</sup>	0.07
Model R <sup>2</sup>	0.182		0.481		0.433	
n	220		211		140	
Effect size	.05		.06		.35	

GRTR, Get Ready to Read; WIPPSI, Wechsler Preschool Primary Scale of Intelligence Animal Pegs subtest; OLPT, IDEA Oral Language Proficiency Test.

<sup>\*</sup>  $p < .05$ .**Table 7**

HLM analysis estimating effects of tools on learning and development (standard score measures)

Variable	SSRS (n = 198)		PPVT-III (n = 209)		EOWPVT-R (n = 204)		WJ-R AP (n = 213)		WJ-R LW (n = 213)	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Fixed effects <sup>a</sup>										
Class-level										
Intercept	96.66 <sup>*</sup>	1.65	74.57 <sup>*</sup>	1.10	66.93 <sup>*</sup>	.52	81.70 <sup>*</sup>	1.20	91.30 <sup>*</sup>	.78
Tools versus control	−7.68 <sup>*</sup>	3.33	3.66	2.12	1.42	1.05	2.56	2.45	−1.32	1.58
Student-level										
Primary language (English = 1, other = 0)			6.49 <sup>*</sup>	1.96						
Age	−.33 <sup>*</sup>	.12								
Pre-test score			.61 <sup>*</sup>	.05	.86 <sup>*</sup>	.04	.60 <sup>*</sup>	.07	.63 <sup>*</sup>	.07
Random effects <sup>b</sup>										
Between-class variance	33.51		6.12		.06		7.66		1.96	
Between-student variance	142.18		151.52		54.28		216.37		105.63	
Intra-class correlation	.270		.001		.0003		.005		.001	
Effect size	−.50		.22		.11		.14		−.11	

PPVT-III, Peabody Picture Vocabulary Test; EOWPVT-R, Expressive One-Word Picture Vocabulary Test-Revised; WJ-R AP, Woodcock–Johnson Applied Problems; WJ-R LW, Woodcock–Johnson Letter–Word Identification; SSRS, Problem Behaviors Scale of the Social Skills Rating System.

<sup>a</sup> Coefficient (S.E.).<sup>b</sup> Variance.<sup>\*</sup>  $p < .05$ .

yield essentially the same estimated effects, but single-level regression analyses tend to underestimate standard errors and, thus, overestimate statistical significance. However, for all of the standard score language and literacy measures, the intra-class correlation (ICC) is .005 or less, raising questions about whether the HLM is necessary for these measures. HLM results are presented in Tables 7 and 8. Given the limited sample size at level two, it is noteworthy that the estimated effect of *Tools*

**Table 8**

HLM analysis estimating effects of tools on learning and development (raw score measures)

Variable	GRTR (n = 220)		WIPPSI (n = 211)		OLPT (n = 140)	
	B	S.E.	B	S.E.	B	S.E.
Fixed effects <sup>a</sup>						
Class-level						
Intercept	9.29 <sup>*</sup>	.26	33.37 <sup>*</sup>	.96	10.18 <sup>*</sup>	.57
Tools versus control	.13	.52	.81	1.96	2.18 <sup>*</sup>	1.17
Student-level						
Age	.23 <sup>*</sup>	.03	.62 <sup>*</sup>	.13	.34 <sup>*</sup>	.07
Pre-test score			.53 <sup>*</sup>	.06	.63 <sup>*</sup>	.09
Random effects <sup>b</sup>						
Between-class variance	.18		5.80		1.90	
Between-student variance	12.21		125.60		30.23	
Intra-class correlation	.021		.063		.045	
Effect size	.03		.05		.34	

GRTR, Get Ready to Read; WIPPSI, Wechsler Preschool Primary Scale of Intelligence Animal Pegs subtest; OLPT, IDEA Oral Language Proficiency Test.

<sup>a</sup> Coefficient (S.E.).<sup>b</sup> Variance.<sup>\*</sup>  $p < .05$ .<sup>+</sup>  $p < .10$ .



on the SSRS remains statistically significant at the conventional .05 level while the estimated effect on the OLPT would be significant at the .10 level and the estimated effect on the PPVT narrowly misses ( $p = .101$ ).

An issue of multiple comparisons arises because of the number of child outcome measures in our study. We have three hypotheses, one each relating to social development, cognitive development, and classroom processes. We have only one measure of social development to test the corresponding hypothesis. However, we have seven measures of cognitive development spanning language, literacy, and mathematics to test that relevant hypothesis. In addition, we have multiple measures of classroom processes relevant to our third hypothesis. Conducting multiple tests of significance across multiple outcome measures raises the risk of Type I, though there is disagreement about the need for adjustments to  $p$ -values and how such adjustments should be made (Cook & Farewell, 1996; Perneger, 1998). For the social development hypothesis there is only one test, so we make no adjustment. For the cognitive effects hypotheses, the estimated effects do not reach statistical significance at conventional levels in the HLM analyses even without an adjustment for multiple comparisons. The ordinary regression estimated effects on the PPVT and OLPT would not be significant at  $p < .05$  adjusting for multiple comparisons. However, it should also be considered that six of the seven estimated effects of *Tools* on cognitive measures are positive ( $p = .07$ , two-tailed exact test). For the hypothesis regarding classroom practices, the estimated effects of *Tools* on total scores for the ECERS-R, SELA, and PCMI are statistically significant even after conservative Bonferroni corrections.

## 7. Discussion

The *Tools of the Mind* (*Tools*) curriculum was constructed on a foundation of Vygotsky's and Luria's theoretical work and practical studies of how children learn and how "tools" can be used to help children and teachers scaffold learning in the classroom. The *Tools* curriculum is a novel approach emphasizing intentional development of specific academic skills and self-regulation of behavior and emotions with play featured in a leading role in the curriculum. The *Tools* curriculum has been implemented in multiple sites, has well-developed training and curriculum materials, and has evidence of effectiveness from quasi-experimental pilot studies (Bodrova & Leong, 2001). This study was designed to conduct a more rigorous test of the educational effectiveness of *Tools* by a research team independent of the curriculum developers. A randomized trial was used to compare *Tools* to the standard practice in an urban school district, which was a district-developed curriculum.

*Tools* was found to improve children's classroom experiences, social development, and, with somewhat less confidence, cognitive development. Our findings are consistent with previous research findings discussed earlier indicating that differences in curricula can produce important differences in children's social development and behavior. The finding of substantial positive effects on social behavior is particularly important in view of concerns that typical child care programs increase problem behavior. Our results also demonstrate that self-regulation can be taught. The effect size for *Tools* is quite large compared to the estimated negative effect of child care, suggesting that this problem may be avoided by use of an appropriate curriculum. Moreover, our findings suggest that polarized debates – about academics versus play, child-initiation versus direct instruction, academic skills versus curiosity, and cognitive development versus socialization – pose false choices and are inadequately conceptualized.

Overall, classrooms in our study were similar in quality to state pre-kindergarten programs in many states (Clifford et al., 2005). However, *Tools* classroom environments were substantially better than the control classroom environments in several respects. Even though the research design equated the two groups on teacher and child characteristics, classroom structure and resources, and amount of in-service training, *Tools* classrooms attained higher overall levels of quality as assessed by the ECERS-R, SELA, and PCI. The advantages of *Tools* on the ECERS-R were particularly evident on the Language and Reasoning, Activities, and Interactions subscales. *Tools* classrooms also scored higher on the SELA, an assessment of the quality of the literacy environment and instruction, and on the PCI, which measures the frequency of use of scaffolding techniques by teachers. In addition, the *Tools* classrooms outperformed the control classrooms on teacher sensitivity and productivity as measured by the CLASS.

The observed differences between *Tools* and control classrooms are highly consistent with the design of the *Tools* curriculum. This provides an additional confirmation beyond the treatment fidelity measures that *Tools* was substantially implemented as designed and produced the changes in children's experiences that were predicted. The correspondence between observed and theoretical differences in curricula helps to rule out other potential explanations for differences in classroom processes and effects on children's learning and development. For example, one counter-explanation is that the effects were due to differences in the teachers. This is unlikely to begin with as teachers were randomly assigned blocking on their backgrounds, and teachers in both types of classrooms received equivalent amounts of training and professional development. Nevertheless, it is important that the specific differences in practice found by observation correspond to specific differences between the curricula. For example, several *Tools* techniques and activities are specifically designed to elicit language interactions between peers and there is an emphasis on teachers' scaffolding children's thinking through language interactions and the development of daily play plans. The implementation of these techniques would contribute to higher scores on the ECERS-R Language and Reasoning and Interactions, the SELA, the PCI, and the CLASS teacher sensitivity item. Similarly, *Tools* trains teachers to arrange play areas and play times so as to promote complex socio-dramatic play (i.e., long uninterrupted blocks of time, with materials for role play available in all center areas). These aspects of *Tools* would be expected to raise scores on the ECERS-R Activities subscale even though the materials in the classrooms are highly similar.

Finally, the fundamental emphasis on self-regulation would be expected to improve productivity as measured by the CLASS. To the extent that *Tools* is successful in enabling children to manage their own behavior, *Tools* teachers have much less need to spend time in managing children's behavior *per se* rather than facilitating their learning.

The findings regarding effects on children's learning and development are highly consistent with the classroom observation findings and the design of *Tools*. The consistency across differences in curriculum goals, observed classroom experiences, and children's learning strengthens confidence that the estimated effects on learning can be attributed to the *Tools* curriculum and are not explained by some other difference. The much lower level of problem behaviors (SSRS) among children in the *Tools* classroom is consistent with the emphasis of *Tools* on self-regulation as a fundamental skill to be developed and supported in the classroom and by results on the CLASS. In addition to focusing on activities that teach self-regulation, *Tools* provides other supports for children's self-regulation. For example, during partner reading, the child who is listening is given a picture of ears and the child who is "reading" has a picture of lips as continuous reminders of their roles. Stronger gains in language, literacy, and to some degree on mathematics would have been expected given the higher scores on Language and Reasoning, the SELA, and the PCI. The evidence of gains on the PPVT-III and OLPT likely reflect the effects of both staff–child language interactions and children's peer language interactions.

It was expected that gains would be smaller for language, literacy, and other cognitive measures than for social behavior. The most striking differences between the two curricula were with respect to activities promoting self-regulation. However, somewhat stronger findings with respect to cognitive development were expected, and it is worth considering why results were not stronger in this domain. One obvious reason is that the study was limited in its statistical power by the study because of the small number of classrooms. Effect sizes of .11–.33 were not statistically significant in this study after adjusting for clustering or multiple comparisons, but such effect sizes are as large as the estimated effects of preschool programs *per se* in some studies (e.g., U.S. Department of Health and Human Services, 2005). Another reason is that the curriculum was not fully implemented for the entire year as indicated by the change in the assessed fidelity over the course of the school year. Had this not been the first year of implementation by these teachers, results might have been stronger. In addition, as is often the case in preschool research, the outcome measures do not fully measure all of the goals of the curriculum. For example, *Tools* is designed to help children develop early literacy skills through writing, but early writing ability was not assessed by any of our measures. Finally, the control curriculum also focused on language and literacy.

Our study had significant strengths. Both teachers and children were randomly assigned to the treatments. Classroom resources, staffing structure, and other programmatic elements were identical between groups. In addition, the study ensured that the timing and amounts of teacher training and support and even experience with the curricula were similar. Although we cannot entirely rule out the possibility that *Tools* teachers were more energized by participation in the study, it seems unlikely that this would continue through the year. Yet, the fidelity measures show that practices improved over the course of the year, and the other measures of classroom practices reveal a pattern consistent with differences in the curricula rather than overall higher enthusiasm or effort by the *Tools* teachers. Multiple measures of both classroom experiences and children's learning and development are strengths, as well.

Our study also had significant limitations. It was conducted in 18 classrooms in a single school district. This limits the statistical power of the study, and there may have been more differences between *Tools* and the control curriculum than those found to be statistically significant. In the most conservative analyses, only the estimated effects on classroom experiences and self-regulation (social behavior) were statistically significant. In less conservative analyses, there was additional evidence for modest effects on language and literacy development. The setting and comparison to a locally developed curriculum limits generalization. While similar circumstances can be found elsewhere, it is unclear how *Tools* might have fared against other curricula in other places. These programs are well funded and have high standards for teacher qualifications, class size, and ratio. The population was almost entirely low-income and Hispanic. Most children came from Spanish-speaking homes, and their English language scores were quite low at entry to the preschool program. However, *Tools* has been implemented elsewhere in half- and full-day programs in head start, public schools, and private child care (Bodrova & Leong, 2001). There is no reason to believe that its advantages would be limited to particular types of programs, though one might hypothesize that the advantages would be greatest for populations for which the development of self-regulation is more problematic, whether because of family circumstances or the child's own special needs.

As noted earlier our evaluation took place during the first year that teachers had implemented *Tools*. Treatment fidelity measures indicated that the curriculum was not fully implemented during the early part of the year. By contrast, some of the control teachers had prior experience with the control curriculum. The *Tools* curriculum could be expected to produce larger effects when teachers have had more experience with the model. Finally, our sole measure of social and emotional development was teacher administered. It would be desirable to have objective measures, as well. Longitudinal studies would be useful to learn about the extent to which effects on self-regulation persist over time and might translate into long-term improvements in behavior and, perhaps, achievement.

In a subsequent study of the same programs with a smaller and somewhat different sample, *Tools* was found to produce positive effects on multiple objective measures of executive function, a construct that overlaps substantially with self-regulation (Diamond, Barnett, Thomas, & Munro, 2007). Important elements of executive function include inhibitory control, working memory, and cognitive flexibility. Each of those elements involves skills relevant to self-regulation, though this may be most obvious for its inhibition. Future studies might investigate these and other individual elements of executive function and self-regulation in greater detail while seeking to illuminate their effects on a range of outcomes including achievement test scores, school progress, internalizing and externalizing behavior problems, and mental health.

Future research is recommended to determine the extent to which our findings can be replicated, expanded, and generalized. Future studies should sample more classrooms (perhaps  $n=40$ ) to ensure that they are adequately powered and to offer a stronger basis for generalization. Such studies might look at stability and variation in curriculum effects across teachers who have a broad range of qualifications, preparation, and experience and across children with different socio-economic backgrounds. Future studies also could expand the range of alternative curricula to which *Tools* is compared and might improve upon our approach to assessing treatment fidelity by having measures tailored to both alternatives rather than just *Tools*. No such instrument existed for the control curriculum in the present study.

In future studies, *Tools* should be compared to both more and less similar curricula. Other approaches to the education of young children that have been influenced by Vygotsky and have some similarities to *Tools*, though they also can differ in their interpretations of his theories and their implications for practice (Berk & Winsler, 1995). Although a detailed comparison is beyond the scope of this paper, the High/Scope and Mediated Learning curricula (though very different from each other) both can be said to reflect key principles articulated by Vygotsky in their practices (Dale, Jenkins, Mills, & Cole, 2005; Sylva, 1997). Reggio Emilia can be viewed as consistent with Vygotsky's principles in key respects (Berk & Winsler, 1995), and the widely used creative curriculum cites Vygotsky as an influence (Dodge, Colker, & Heroman, 2002). Curricula that are more similar to *Tools* would seem more likely to produce similar effects on self-regulation, and studies comparing them to *Tools* would be particularly interesting for that reason. It would also be interesting to compare *Tools* to Direct Instruction and other models with clearly opposed theoretical foundations. In light of previous research, such studies should be set-up to permit follow-up over time.

Finally, our focus was on the implementation of *Tools* and its effects on specific measures of children's learning and development. It should not be forgotten that the goals and objectives of early education are broader than our measures. Not only are the domains tapped here broader than our measures, but the educational goals people have for their children are broader yet. Research must be careful not to overly simplify the problem of improving early education. In addition, at least some future studies should also focus on the teacher's role in determining the ends of education and not just as a means of delivering a curriculum. Policy decisions about curriculum, as well as about teacher preparation, qualifications, and pay may profoundly influence this role.

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## THE EARLY YEARS

# Preschool Program Improves Cognitive Control

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Executive functions (EFs), also called cognitive control, are critical for success in school and life. Although EF skills are rarely taught, they can be. The Tools of the Mind (Tools) curriculum improves EFs in preschoolers in regular classrooms with regular teachers at minimal expense. Core EF skills are (i) inhibitory control (resisting habits, temptations, or distractions), (ii) working memory (mentally holding and using information), and (iii) cognitive flexibility (adjusting to change) (1, 2).

## Significance

EFs are more strongly associated with school readiness than are intelligence quotient (IQ) or entry-level reading or math skills (3, 4). Kindergarten teachers rank skills like self-discipline and attentional control as more critical for school readiness than content knowledge (5). EFs are important for academic achievement throughout the school years. Working memory and inhibition independently predict math and reading scores in preschool through high school [e.g., (3, 6, 7)].

Many children begin school lacking in EF skills (5). Teachers receive little instruction in how to improve EF and have preschoolers removed from class for poor self-control at alarming rates (8, 9). Previous attempts to improve children's EF have often been costly and of limited success (10–12). Poor EFs are associated with such problems as ADHD, teacher burnout, student dropout, drug use, and crime (2). Young lower-income children have disproportionately poor EFs (13, 14). They fall progressively farther behind in school each year (15).

## The Study

The opportunity to evaluate Tools of the Mind (Tools) and another curriculum arose when a low-income, urban school district

agreed to randomly assign teachers and children to these two curricula. Our study included 18 classrooms initially and added 3 more per condition the next year. Quality standards were set by the state. All classrooms received exactly the same resources and the same amounts of teacher training and support (2). Stratified random assign-



"Buddy reading." Two preschoolers engaged in Tools activity. The ear line-drawing held by one guides her attention (2).

ment of teachers and assistants minimized confounds due to teacher characteristics.

**EF-training curriculum: Tools.** The Tools curriculum (16) is based on Vygotsky's insights into EF and its development. Its core is 40 EF-promoting activities, including telling oneself out loud what one should do ("self-regulatory private speech") (17), dramatic play (18), and aids to facilitate memory and attention (19). Tools teachers spent ~80% of each day promoting EF skills. Tools has been refined through 12 years of research in preschools and kindergartens. Only when EFs were challenged and supported by activities throughout the day did gains generalize to new contexts (2).

**District's version of Balanced Literacy curriculum (dBL).** The curriculum developed by the school district was based on balanced literacy and included thematic units. Tools and dBL covered the same academic content, but dBL did not address EF development. [For teacher training and fidelity, see (2).]

**Participants.** Data are reported on 147 preschoolers (62 in dBL and 85 in Tools) in

Cognitive control skills important for success in school and life are amenable to improvement in at-risk preschoolers without costly interventions.

their second year of preschool (average age: 5.1 years in both) who received dBL or Tools for 1 or 2 years. Those who entered in year 2 had attended other preschools for a year. All came from the same neighborhood and were randomly assigned to Tools or dBL with no self-selection into either curriculum. All came from low-income families; 78% with yearly income <\$25,000 (2).

After year 1, so convinced were educators in one school that Tools children were doing substantially better than dBL children that they halted the experiment in their school, reducing our sample of dBL children.

**Measures of EF.** Outcome measures (the Dots task and a Flanker task) were quite different from what any child had done before. These measures are appropriate for ages 4 through adults, assess all three EF components, and require prefrontal cortex (20–21). They were administered in May and June of year 2.

In all conditions of the Dots task (20), a red heart or flower appeared on the right or left. In the congruent condition, one rule applied ("press on the same side as the heart"). Dots-Incongruent also required remembering a rule ("press on the side opposite the flower") plus it required inhibition of the tendency to respond on the side where the stimulus appeared. In Dots-Mixed, incongruent and congruent trials were intermixed (taxing all three core EFs). Children were given a lot of time to respond [over five times as long as preschoolers usually take (20)].

The central stimulus for our Flanker task was a circle or triangle. Memory demands were minimized by a triangle atop the right-hand key and at the bottom right of the screen, with similar aids for the left-hand circle response. The image to focus on was the small shape in the center; the distractor (or flanker) to be ignored was the larger shape surrounding it. Congruent (e.g., ○ inside ○) and incongruent (e.g., △ inside ○) trials were intermixed. Next came "Reverse" Flanker, where children had to focus on the outside shape, inhibiting attention to the inside, plus flexibly switching

mindsets and attentional focus. The rules were still “press right for  $\Delta$  and left for  $\bigcirc$ .” Again, children were encouraged to take their time and not to rush.

Independently, NIEER administered academic measures to Tools children only. These are described in (2).

## Results

We report accuracy rather than speed because, for young children, accuracy is the more sensitive measure (23). We conducted multiple regression analyses with age, gender, curriculum, and years in curriculum as independent variables. Interaction terms were insignificant and were dropped. On Dots-Congruent, which had minimal EF demands, children performed similarly regardless of curriculum, year in a curriculum, or gender, though older children performed better.

When an inhibition demand was added (Dots-Incongruent), Tools children significantly outperformed dBL children (see the figure, left of above). Dots-Mixed taxed all three EF skills and was too difficult for most dBL children: Almost twice as many Tools as dBL children achieved >75% correct on training trials (see the figure, right of above).

Our Flanker task, like Dots-Incongruent, taxed inhibition (with minimal memory or flexibility demands). Tools children significantly outperformed dBL children (figure above). On Reverse Flanker, dBL children performed near chance (65% correct), but Tools children averaged 84% correct (see figure, above). Thus, the most demanding Dots and Flanker conditions showed the largest effects; those effects are socially significant because they are sizeable.

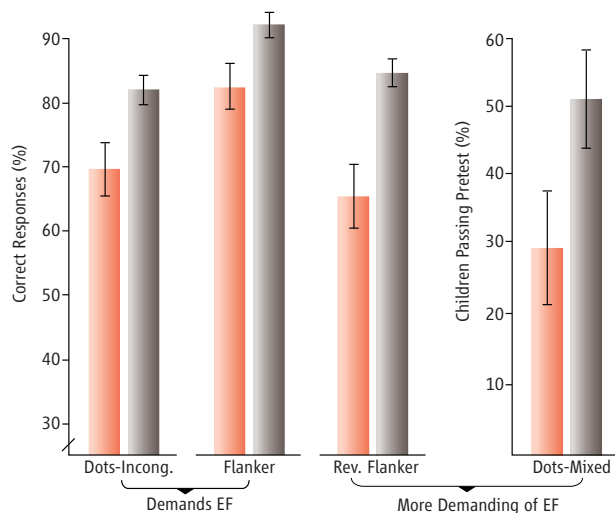
Tasks that were more demanding of EFs correlated more strongly with standardized academic measures. For example, “Get Ready to Read” scores correlated 0.05, 0.32, and 0.42 with Dots-Congruent, -Incongruent, and -Mixed, respectively (2).

## Conclusions

Some think preschool is too early to try to improve EFs. Yet it can be done. EFs can be improved in 4- to 5-year-olds in regular public school classes with regular teachers. Being in

Tools accounted for more variance in EFs than did age or gender and remained significant when we controlled for those. These findings of superior scores by Tools children compared with closely matched peers on objective, neurocognitive EF measures are consistent with teachers’ observations (24).

Although play is often thought frivolous, it may be essential. Tools uses mature, dramatic



**Tools children (blue) performed better on measures of EF than dBL children (red) did.** (A) The dependent measure is percentage of correct responses. Dots-Incongruent, Flanker, and Reverse Flanker tasks are described in the text. (B) The dependent measure is percentage of children passing the pretest for this task. Statistics are reported in the SOM (2).

play to help improve EFs. Yet preschools are under pressure to limit play.

If, throughout the school day, EFs are supported and progressively challenged, benefits generalize and transfer to new activities. Daily EF “exercise” appears to enhance EF development much as physical exercise builds bodies (2).

The more EF-demanding the task, the more highly it correlated with academic measures. Superior academic performance has been found for Tools children in other schools and states, with other teachers and comparison curricula (24, 25). EFs [especially self-discipline (inhibition)] predict and account for unique variance in academic outcomes independent of and more robustly than does IQ (2, 3, 26).

Tools successfully moves children with poor EFs to a more optimal state. It is not known how much it would help children who begin with better EFs.

No study is perfect, and ours is no exception. Before and after measures of EFs, as well as academic measures in dBL children, would have strengthened it. Strengths include random assignment and use of objective measures. No authors or testers had a stake in either

curriculum. Many competing explanations have been ruled out (2).

Most interventions for at-risk children target consequences of poor EFs rather than seeking prevention, as does Tools. We hypothesize that improving EFs early may have increasing benefits over time and may reduce needs for costly special education, societal costs from unregulated antisocial behavior, and the number of diagnoses of EF disorders [e.g., ADHD and conduct disorder (2)].

## References and Notes

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I N N O D A T A  
M O N O G R A P H S – 7

TOOLS OF THE MIND:  
A CASE STUDY OF IMPLEMENTING  
THE VYGOTSKIAN APPROACH  
IN AMERICAN EARLY CHILDHOOD  
AND PRIMARY CLASSROOMS

Elena Bodrova and Deborah J. Leong



INTERNATIONAL BUREAU OF EDUCATION

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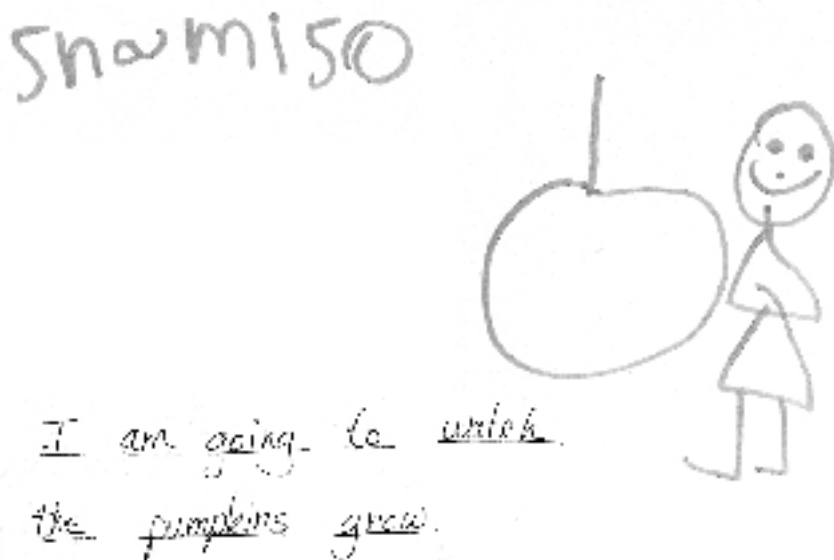
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# Foreword

The Tools of the Mind project aims to foster the cognitive development of young children in relation to early literacy learning. The authors of the project have developed a number of tools to support early learning and a highly innovative method for training teachers in using these approaches. Piloting of the approaches has demonstrated their potential to develop children's early literacy skills and they are being increasingly used in early childhood education programmes across the United States. The project is the result of collaborative work between Russian and American education researchers, based on the theories of Vygotsky, applied to the cultural context of the United States. This monograph describes the development and piloting of the project, including the creation of the Early Learning Advisor, a computerized assessment system which provides direct advice to teachers on the developmental levels of their individual students, and gives them suggestions about how to apply the innovative teaching concepts in their daily work in the classroom.

FIGURE 1. Play plan by Shamiso in November



# Introduction

The Tools of the Mind project began as a search for tools to support the cognitive development of young children. We ended up focusing on the development of a number of teaching tools to scaffold early learning and a unique method of training teachers in how to use these tools. On the basis of the Vygotskian approach, we created a series of tools or strategies to support the development of early literacy, including meta-cognitive and meta-linguistic skills as well as other foundational literacy skills. The results of an empirical evaluation of the project revealed that the strategies had a positive effect on literacy achievement in young children.

As the project grew, so did the number of teachers who wanted to be trained in how to implement these innovative strategies. The traditional workshop/class format we used to train teachers was not as effective as we wanted it to be—something that other researchers in staff development have also discovered. In response to this, we took a unique approach to teacher training by using child assessment and technology to transfer expert knowledge to the classroom teacher. With Dr Dmitri Semenov, an expert in mathematical modelling of psychological processes and design of artificial intelligence systems, we developed a diagnostic-prescriptive computerized assessment system—the Early Literacy Advisor (ELA). The ELA acts as an ‘expert teacher’ capable of giving advice on how to address the specific instructional needs of an individual student. Consequently, instead of general workshops on literacy development, teachers are given specific results from the assessments of their own students described in terms of the relevant developmental patterns. Instead of a workshop on literacy activities, the assessment results include the literacy activities most suitable for the children in their classroom. And instead of lectures on the Vygotskian approach, teachers learn about the concepts of *zone of proximal development* and *scaffolding* as they apply them in their own teaching. At many levels, the ELA was able to break down barriers to innovation.

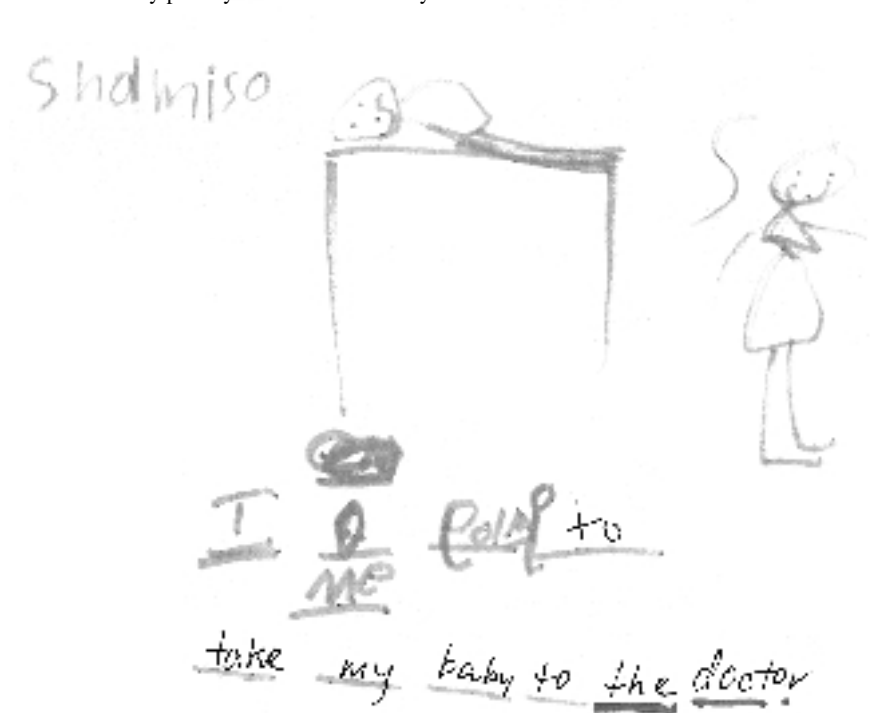
The Tools of the Mind project began in two classrooms with three interested teachers. It has grown over eight years to influence hundreds of teachers and their students through educational videos, books, articles and the use of the ELA.

We believe that this project demonstrates that good educational practices originating in one country can spark the creation of new practices that fit the cultural context of another country, but still remain faithful to the theoretical foundations underlying the original. The results can be extremely positive and

unique—something that would not have been developed in either country without the exchange of ideas. A necessary ingredient for innovation is the thoughtful exchange between researchers and practising teachers so that the newly developed instructional practices can address critical learning problems in a way that the teacher can easily implement in the classroom. In our case, two early childhood teachers in particular—Ruth Hensen and Carol Hughes—made this possible. We have seen many programmes that try to adapt the classroom to the innovation instead of developing the innovation to fit the structure and organization of the classroom. An innovation cannot survive unless empirical research is used to validate the effects of the newly developed tools. Dissemination and evaluation go hand in hand.

The INNODATA programme is designed to foster the kind of cross-fertilization embodied in Tools of the Mind by providing a forum to share the experiences of researchers who have tried to implement and evaluate these kinds of innovative programmes. We hope that our experience will be useful to other researchers struggling with similar problems and issues.

FIGURE 2. Play plan by Shamiso in February



# National/regional and local contexts in which the innovation was conceived

The Tools of the Mind project was conceived at a time when a national consensus was already established about the importance of early childhood education. Recognizing the need to increase the quality of these programmes, the National Association for the Education of Young Children (NAEYC) began to accredit early childhood education programmes, using the idea of developmentally appropriate practice as its core. Developmentally appropriate practice is instruction that is both age and individually appropriate (Bredekamp & Rosegrant, 1992). As programmes adapted to obtain the NAEYC accreditation, this very broad definition of instructional practice led to several problems. First, most teachers did not have enough knowledge about child development to be able to practically decide what to do in the classroom. In addition, the research base used to define developmental patterns was being modified at a rate that only academic experts in the field could keep up with. Second, the broad and open-ended nature of the definition was subject to a wide variety of interpretations—for some it meant no teaching at all and for others it meant very teacher-directed instruction.

At about the same point in time, the spotlight of accountability hit elementary schools in the United States. The standards-based movement was the result of the American public's growing dismay over the low levels of achievement of American students in general and specifically on international tests in maths and literacy. Schools in the United States have always been under the control of local communities, so that what children learned was primarily determined by local (city or county) school boards. Therefore, goals for student achievement have not been set at a national level. Many people suspected that the variability in objectives was a major cause of stagnant and often dismal test scores, so many states began to set standards, to assess children and to hold school districts, schools and teachers accountable for student achievement. These new state standards have begun to supersede local control, mandating specific levels of attainment and specific assessments that would allow the public to compare the successes and failures of schools within the same district or state. At the beginning of the standards movement, academic standards did not extend to pre-school and kindergarten, but this trend is changing (see Bowman, Donovan & Burns, 2000). Several states have now developed standards specifically for young children, and the number of states is sure to grow. For the first time, Head Start—a federally funded programme for at-risk pre-school children—was mandated to identify performance standards for

children. With the growing emphasis on academic performance in pre-school and kindergarten, teachers are now looking for guidance in how to choose instructional practices that are not only developmentally appropriate but also produce consistent achievement gains (Bodrova, Leong & Paynter, 1999).

Along with accreditation and the accountability movement, another trend in early childhood education that influenced the Tools of the Mind project and led to the development of the ELA assessment system was the growing dissatisfaction in the 1990s with standardized assessment, particularly when used to assess young children. Many professional groups—researchers, educators and test makers—began to criticize the use of paper-pencil standardized tests with young children (National Association for the Education of Young Children, 1987; Shepard, Kagan & Wurtz, 1998). Standardized tests were criticized because they were not authentic, tended to underestimate children's knowledge, and penalized children who were from different ethnic and minority groups. In addition, standardized testing often provided little useful information for making classroom decisions. The outcry led to a movement to develop standardized assessment systems (the same procedure is used for all children) that are different from traditional standardized tests. Emphasizing the importance of authentic classroom assessment, these new assessment systems are related more directly to classroom decisions and must be integrated with benchmarks and standards.

Another aspect of the national context that has influenced the implementation of the innovation is the continued diversity of American public schools. The ethnic, cultural, linguistic and social diversity of the American classroom has long been documented in educational research. Few countries have the level of diversity found in the United States. Attempts to respect these differences, while at the same time teaching all children the skills and requisite knowledge to make them productive and literate members of society, have been and continue to be a struggle. The search for innovation has as its highest priority those classroom practices that work with diverse students.

Finally, the national and local context in which the Tools of the Mind project was developed has also been influenced by the growing shortage of experienced teachers. The need to train teachers more quickly has grown. Two trends have been cited as possible causes for this teacher shortage. First, many states have implemented school reforms that reduce class size, particularly in the early grades. Secondly, because of the anomaly of the 'baby boom generation', more practising teachers are retiring, and so there would be a teacher shortage even without reduced class sizes. As a result, teachers are being hired to teach in pre-school and kindergarten with degrees in fields other than early childhood or without experience in the early childhood classroom. School districts are struggling even more than normal with the need to train on the job. Cost-effective ways of conducting in-service training in early literacy has become a top priority.

# Specific problematic issues addressed

The Tools of the Mind project was developed to address the following issues facing the educators of young children, from age 3.5 to 7 (pre-school to Grade 2):

- The need for developmentally appropriate teaching techniques to scaffold both underlying cognitive skills and foundational literacy skills for a diverse population of children;
- The need for instruments that combine the best features of standardized and authentic classroom assessments;
- The need for a mechanism to monitor child progress towards standards and to provide timely feedback to teachers; and
- The need for a vehicle for ongoing transfer of expert knowledge to teachers, especially novice teachers.

FIGURE 3. Play plan by Shamiso in May



# Vygotsky's theory of learning and development

The theoretical framework that forms the basis of our work is the Cultural-Historical Theory of Lev Vygotsky (1896–1934). Of the many aspects of this theory that profoundly influenced psychological thought in the twentieth century, the Tools of the Mind project primarily focused on the aspects that address issues of learning and development. The revolutionary approach to these issues pioneered by Vygotsky has linked these two processes together in a way that was never before considered. According to Vygotsky, some of the developmental outcomes and processes that were typically thought of as occurring ‘naturally’ or ‘spontaneously’ were, in fact, substantially influenced by children’s own learning or ‘constructed’. Learning, in turn, was shaped by the social-historical context in which it took place. This dual emphasis—on children’s active engagement in their own mental development and on the role of the social context—determined the name used to describe the Vygotskian approach in the West—‘social constructivism’.

## CULTURAL TOOLS AND HIGHER MENTAL FUNCTIONS

The kind of learning (and, consequently, teaching) that leads to changes in development was described by Vygotsky (Vygotsky, 1978) as the situation in which children acquire specific cultural tools, handed to them by more experienced members of society. These cultural tools facilitate the acquisition of *higher mental functions*—deliberate, symbol-mediated behaviours that may take different forms dependent on the specific cultural context.

Higher mental functions exist for some time in a distributed or ‘shared’ form, when learners and their mentors use new cultural tools jointly in the context of solving some task. After acquiring (in Vygotsky’s terminology ‘appropriating’) a variety of cultural tools, children become capable of using higher mental functions independently. Vygotsky called this progression from the ‘shared’ to the ‘individual’ state *the law of the development of higher mental functions* (Vygotsky, 1978).

Tools for higher mental functions have two faces: external and internal (Luria, 1979; Vygotsky, 1978). On the external plane, the tool is one that learners can use to solve problems that require engaging mental processes at levels not yet available to children (e.g. when a task calls for deliberate

memorization or focused attention). At the same time, on the internal plane, the tool plays a role in the child's construction of his/her own mind, influencing the development of new categories and processes. These new categories and processes eventually lead to the formation of higher mental functions such as focused attention, deliberate memory and logical thought.

## CULTURAL TOOLS AND THEIR EFFECT ON EARLY LEARNING

The process of learning cultural tools begins in the early years when children first encounter cultural artifacts and procedures associated with using them; they learn to use language first to communicate with other people and later to regulate their own behaviour. This is also the time when they first become participants in 'shared activities'—from the emotional exchanges of infants with their caregivers to the joint problem solving of older children. One of the major outcomes of this process is the ability to take control of their own behaviours—physical, social, emotional and cognitive—through employing their higher mental functions. Vygotsky described this as 'becoming a master of one's own behaviour', as opposed to being 'slave to the environment' (Vygotsky, 1978). In terms of young children's behaviours, this is easy to demonstrate with the example of memory.

In the beginning, children who are not 'armed' with the necessary tools have little or no control over what they can remember and when they can remember it. For these children, these 'whats' and 'whens' are almost totally determined by the environment: a 3-year-old cannot recite a nursery rhyme when asked to do it, but can do it once a teacher starts reciting this rhyme or when this rhyme's character appears on a television screen. This type of spontaneous remembering is governed by the laws of association: children only remember things when they are repeated over and over or continually practised in a fun and engaging activity. While it is possible to employ these rules of association in teaching limited content to very young children, the content demands imposed by formal schooling make it necessary to engage in more efficient and deliberate strategies of remembering. Thus, as a child makes the transition from less formal to more formal learning contexts, the child has to learn how to 'take in a teacher's plan and make it his/her own'. For educators who share Vygotsky's beliefs about the processes of learning and development, the goal of early instructional years involves more than merely transferring specific knowledge—it involves arming children with tools that will lead to the development of higher mental functions (Bodrova & Leong, 1996).



## ZONE OF PROXIMAL DEVELOPMENT

The concept of the 'zone of proximal development' (ZPD) is by now quite familiar even to educators working outside the Vygotskian framework. However, the applications of this concept to instructional practice are not numerous, and in many cases the ZPD is used as a metaphor rather than as a theory (Bodrova & Leong, 1996). The ZPD is defined as a distance between two levels of a child's performance: the lower level that reflects the tasks the child can perform independently and the higher level reflective of the tasks the same child can do with assistance.

To successfully apply the concept to instruction, the ZPD has to be placed in a broader context of the Cultural-Historical Theory. It is important to remember that the ZPD reflects the view Vygotskians hold of the relationship between learning and development: what develops next (proximally) is what is affected by learning (through formal or informal instruction). Consequently, the concept of the ZPD is applicable to development only to the degree in which development might be influenced by learning (Vygotsky, 1978). Behaviours having a strong maturational component, for example, could not be described using the ZPD. In addition, for any developments to be influenced by learning, there must be a mechanism that supports the progression of a newly learned/developed process from assisted to individual. In some cases this mechanism is absent and consequently this progression may never occur. This leads us to the next Vygotskian idea that has generated a strong following in the area of education—the idea of scaffolding.

## SCAFFOLDING

Although scaffolding is not one of Vygotsky's initial terms, the concept is a useful one because it makes more explicit some of the instructional implications of the idea of the ZPD. Introduced almost forty years after Vygotsky's death by Jerome Bruner (Wood, Bruner & Ross, 1976), scaffolding describes the process of transition from teacher assistance to independence. It answers the frequently asked question about the ZPD: if a child can function at a high level only with assistance, how can this child eventually be able to function at the same level independently?

Scaffolding answers this question by focusing on the gradual 'release of responsibility' from the expert to the learner, resulting in a child eventually becoming fully responsible for his/her own performance. This gradual release of responsibility is accomplished by continuously decreasing the degree of assistance provided by the teacher without altering the learning task itself. Emphasizing the fact that the learning task remains unchanged makes scaf-

folding different from other instructional methods that simplify the learner's job by breaking a complex task into several simple ones. While breaking the task into simple subtasks may work for some areas (demonstrated by some successes of programmed instruction), in other areas, breaking a task into several component tasks actually changes the target skill or concept being learned. This alteration leads to learner difficulty when trying to master complex skills.

In contrast, scaffolding makes the learner's job easier by providing the maximum amount of assistance at the beginning stages of learning and then, as the learner's mastery grows, withdrawing this assistance. However, the question remains: how does a teacher choose the right kind of assistance and then withdraw it in such a way that the student's independent performance stays at the same high level as it was when the assistance was provided? Unfortunately, without an answer to this question, scaffolding will remain more of a metaphor for effective teaching than a description of a specific instructional strategy for teachers to use. In search of this answer, we will turn to the work done within Cultural-Historical Theory by colleagues of Vygotsky and generations of his students.

FIGURE 4. Play plan by Krystine in November



# Subsequent developments in the Cultural-Historical Theory as a foundation for instructional practices

Vygotsky first formulated the major principles of the Cultural-Historical Theory, but it took several subsequent decades of work by his colleagues and students to apply these principles to education and to develop new instructional practices based on these principles. Vygotskians elaborated primarily on the idea of ‘cultural tools’ and were able to identify the specific tools most beneficial for different areas of learning and development. They were also able to describe processes leading to the acquisition of these tools and the role of the teacher in facilitating these processes. These subsequent developments of the Vygotskian approach resulted in the addition of new ideas to the original framework that—along with original Vygotskian concepts—have influenced our work. These ideas include the concepts of the *orienting basis of an action*, *external mediators*, *private speech* and *shared activity* and the idea of *play as a ‘leading activity’* (Elkonin, 1977; Galperin, 1969; Leont’ev, 1978; Luria, 1979; Venger, 1988).

## ORIENTING BASIS OF AN ACTION

According to Galperin (Galperin, 1969; 1992), ‘orienting basis of an action’ describes how a learner represents the learning task in terms of the actions he/she will perform in relation to this task. For the learning of a new task to be successful, the learner’s actions must be driven by the critical attributes of the task. In identifying these critical attributes, the learner has to deal with a variety of elements that might orient her/him within the task in a more or less appropriate way. Failure to include some of the critical attributes results in errors and may not produce a desired learning outcome. If the learner pays attention to non-essential attributes of the task, he/she may be distracted from the most relevant features, which can also result in errors in learning. For example, if a student does not include the notion of letter orientation in her/his orienting basis of handwriting, letter reversal will result. When the learning task is complex and requires a variety of actions, it is usually difficult for the students to develop the correct and comprehensive orienting basis necessary to succeed. In this case, Galperin suggests that teachers provide scaffolding by first helping students develop the appropriate orienting basis, and then by

teaching students how to monitor their actions using the orienting basis as a reference point. An essential component of scaffolding would include using tangible objects or graphic representations to support the development of an adequate mental representation of the action.

## EXTERNAL MEDIATORS

External mediators are among the first tools children use and include tangible objects, pictures of the objects, and physical actions that children use to gain control over their own behaviour. As with all cultural tools, the function of the external mediators is to expand mental capacities such as attention, memory or thinking, and to allow the person who uses the tool to perform at a higher level.

In his own writing, Vygotsky (Vygotsky, 1978; 1987) used some examples of external mediators to illustrate the evolution of cultural tools throughout the history of humankind. However, when talking about cultural tools used by modern humans, Vygotsky primarily focused on the language-based tools, although he acknowledged that young children may still need more 'primitive', non-verbal tools. It was through the work of Vygotsky's colleagues Luria, Leont'ev, Elkonin and Galperin, as well as the subsequent generations of Vygotskians, that the role and the development of both verbal and non-verbal tool use by young children was thoroughly investigated (see Elkonin, 1963; Galperin, 1992; Venger, 1988).

## PRIVATE SPEECH

With the general emphasis that Cultural-Historical Theory places on language as a universal cultural tool, private speech presents only a small portion of the whole picture. However, private speech is an important language tool a child uses to master his/her own behaviour. A child who uses private speech may seem to be talking to somebody since he or she is talking out loud; however, in reality the only person this child communicates to is him/herself. Thus, private speech is speech that is audible to an outside person but is not directed to another listener. While adults occasionally use private speech, children of pre-school or elementary school age benefit from it most. According to Vygotsky (Vygotsky, 1987), private speech in young children is a precursor of verbal thinking since it serves as a carrier of thought at the time when most higher mental functions are not fully developed. As was later found by Luria (1979), and then confirmed by many studies within and outside the Vygotskian framework, private speech has another important function: it helps children regulate both their overt and mental behaviours (Berk & Winsler, 1995; Galperin, 1992).

## SHARED ACTIVITY

Since Vygotsky's works were translated into other languages over more than thirty years ago, the association between Vygotsky's theories and the idea of shared or collaborative activities has been firmly established. However, this association has mainly led to an interest in expert–novice interactions or interactions between peers. In reality, pedagogical applications of this idea go far beyond the issue of optimal instructional interactions. According to Vygotsky, partners in shared activity share more than a common task; they also share the very mental processes and categories involved in performing this task (see the law of the development of higher mental functions, page 9). From an instructional perspective, this means that the mental processes employed by a teacher or by a more experienced peer tutor should be the same ones as would be eventually appropriated by the learner.

Another instructional application of the concept of shared activity applies to a group of mental processes traditionally described under the name of 'metacognition' or 'self-regulation'. These essential learning processes are typically studied in older children when they become able to regulate their cognitive functioning. However, from the Vygotskian perspective, the origins of these processes can be found much earlier, when young children start practising self-regulatory functions by regulating other people's behaviour. Thus, engaging young children in activities where they can practise other-regulation as well as self-regulation will contribute to the development of their meta-cognitive abilities (Bodrova & Leong, 1996).

## PLAY AS A LEADING ACTIVITY

Symbolic or dramatic play occupies a special place in Vygotsky's theory of learning and development (Berk & Winsler, 1995; Bodrova & Leong, 1996). Play is the activity that is most conducive to development in young children. For children to have the full benefit of play, the play itself must have specific features. For Vygotskians, these features include imaginary situation, roles and rules. While the roles are explicit, the rules that govern the relationship between these roles are typically hidden or implicit. When children enter play they are expected to know what the rules are and the players are only reminded of these rules when they fail to follow them. Thus, as long as everyone follows the same set of rules, these rules will be hidden from an outside observer, which might create an illusion of free-flowing play unconfined by any regulations.

Vygotsky and his colleagues argue that play is not the most unrestricted, 'free' activity, but rather that it presents the context in which children face more constraints than in any other context. Although it is constraining, play is

also one of the most desirable activities of childhood because children are extremely motivated to abide by these limits. Thus, play provides a unique context in which children are motivated to act and at the same time develop the ability to self-regulate their behaviour. The psychological nature of play facilitates the practice of deliberate and purposeful behaviours at a child's highest attainable level (Elkonin, 1977; 1978). As play matures, there is a progressive transition from reactive and impulsive behaviours to behaviours that are more deliberate and thoughtful.

## THE LINK BETWEEN THE THEORETICAL FOUNDATIONS AND THE TOOLS OF THE MIND PROJECT

The Vygotskian approach has influenced not only the development of teaching strategies, but also the choice of areas where these strategies are applied and the time at which they are expected to be most effective. The teaching strategies described in the next section directly apply the ideas of the ZPD, scaffolding, external mediators, private speech and shared activity. The idea of the orienting basis of activity was used in identifying the exact procedures and materials needed to implement each of the strategies.

The ideas of the Cultural-Historical framework are also reflected in the design of the ELA. The computerized system is designed to give the best estimate of the child's ZPD and to recommend teaching techniques to provide the optimal level of assistance within this ZPD.

FIGURE 5. Play plan by Krystine in February



# Description of the innovation

In this section, we will describe the innovations created using the Vygotskian framework outlined above. We have selected a sampling of strategies, a description of the ELA computerized assessment system, and a description of the educational videos developed for dissemination.

## PLAY AND PLAY PLANNING

True to Vygotskian beliefs about the importance of dramatic play in the development of young children, in our classrooms, dramatic play occupies the central place among daily activities (Bodrova & Leong, 1998a; 1999). Throughout the entire pre-school year and at the beginning of the kindergarten year, elements of dramatic play permeate most of the activities. In addition, pre-school classrooms have a designated dramatic play area where children spend forty to fifty minutes per day in sustained play. Kindergarten children spend closer to forty minutes at the beginning of the year and then as most kindergartens begin more formal instruction in January, the time spent in play in the classroom drops to twenty minutes. Special instructional strategies are used to support all elements of play. In typical early childhood classrooms in the United States, teachers will set aside this amount of time, but children will wander around the room, unable to sustain play. Teachers and school administrators who visit the Tools of the Mind classrooms are surprised at the level of intensity and involvement of the children.

To help children first initiate and then sustain an imaginary situation, the teacher in the project makes sure that the children have a sufficient repertoire of themes that would serve as inspiration for pretend play. To expand this existing repertoire of themes, the teachers use such sources as field trips, visitors' presentations, videos and books. The choice of themes is determined by the children's interests and by the themes already in their repertoire. For example, among themes introduced over several years are space, farm, treasure hunt, store, hospital, veterinarian's office and restaurant.

Props also sustain the imaginary situation. Today's toys so closely replicate their 'grown-up' counterparts (for example, plastic food and toy kitchen utensils) that only when play is at its most mature do children use their imaginations to create props. Many children believe that they cannot play without the specific prop. Instead of pretending the Barbie doll is a dentist, a child will want to buy the 'Dentist Barbie'. In the Tools of the Mind project, teachers try to wean children from the need for specific props by introducing games in

which children think of different ways to play with ordinary objects. They brainstorm ways in which a wooden block can be used—as a baby, a ship or a chair for a doll. Teachers transition children from using realistic props to using minimal props. In playing hospital, for example, a piece of cloth can be used as a nurse's cap, to make a sling for a patient's broken arm or to wrap another patient's sore throat. Children pretend that a bead on a necklace is a stethoscope. Generally, children need only minimal props to indicate the role they are playing and those props can be re-used later for other themes.

To increase the level of mature play, teachers in the project also help children to expand the number of roles in a theme. If children have a limited repertoire of roles or do not quite know what they are supposed to do when acting out a specific role, they cannot sustain dramatic play for a long period of time. For example, if children play hospital they are not limited in their choice by the roles of doctor and patient. They can also play roles such as nurse, pharmacist, x-ray technician or patient's parent. Having such a variety of characters makes play richer in content and also helps prevent children from fighting over one specific role. During field trips or visitors' presentations, teachers focus children's attention on *what* people do and *not* on the objects they use. For example, a visit to a fire station is not likely to lead to a rich play afterwards if children spend all their time exploring the inside of a fire truck. On the contrary, it may even produce conflicts in a play area if there is only one toy fire truck or only one fire-fighter hat. A much more productive use of this field trip would be to introduce children to various activities that people at the fire station are engaged in: answering the phone, driving the truck, putting out fires, administering first aid, etc.

## PLAY PLANNING

One of the most effective ways of helping children to develop mature play is to use 'play plans'. A play plan is a description of what the child expects to do during the play period, including the imaginary situation, the roles and the props. Play planning goes beyond the child saying, 'I am going to keep house', to indicate what the child will *do* when he/she gets there such as, 'I am going to play shopping and making dinner' or 'I'm going to be the baby'. Two or more children can plan together if they are interested in playing the same thing or going to the same area. If children want to change their plans, they are encouraged to do so. It is the action of mentally planning that is the major benefit to the child. The figures appearing at the ends of chapters show the progression of play plans for two pre-school children: Shamiso (Figures 1, 2 and 3) and Krystine (Figures 4, 5 and 6). The progression of play plans shown begins with messages dictated to the teacher and ends with the child's attempts to write his/her own message.



In some other early childhood programmes, children plan their activities aloud. However, we found that planning on paper is much more effective than planning orally. Both the children and the teacher often forgot the oral plan. The drawn/written plan is a tangible record of what the child wanted to do that other children as well as that child and the teacher could consult. Many of our teachers take dictation and write what the child dictates about their plan at the bottom of the page, thus turning the planning session into a literacy activity.

For Vygotskians, the external mediation feature of planning on paper strengthens play's self-regulation function. It provides a way for both the child and the teacher to revisit the plan because it serves as a mediator for memory. In creating, discussing and revising their plans, children learn to control their behaviours in play and beyond, thus acquiring self-regulatory skills. Finally, teachers use play planning to influence dramatic play without intervening in and disrupting the play as it is occurring. The teacher suggests to children ahead of time how they can try out new roles, add new twists to the play scenario, or think of a way to substitute for missing props. Potential 'hot spots' are worked out in advance.

In the Tools of the Mind classrooms, play plans increased the quality of child play and the level of self-regulation, both cognitive and social. When teachers did planning every day, children showed gains in the richness of their play. In addition, there was less arguing and fighting among the children. Asking the parties if the argument was 'part of their plan' easily solved the disputes. Of course, they had not planned to argue and immediately returned to their original plan. Arguments seldom blew up into situations where there were power struggles with the teacher. In the long run, after plans had been used for several months, there were few fights since potential problems were defused before the play began.

There are several other benefits to play plans that are worth noting. First, the play plans provided a wonderful way for parents to find out about what goes on in the classroom. They provided a context for parents and children to discuss the day and help parents to feel more involved. Second, the written plans documented the child's progress in both symbolic representation and literacy skills. Third, the plans provide a meaningful context in which to use literacy skills. In our findings, many children began to act like writers by drawing and writing their plan in 'pretend writing' and then telling the teacher what the 'words' meant. For the at-risk children who have not had opportunities to 'write' at home, this is a good place to start literacy activities. Finally, teachers reported that play plans provided a special moment of connection with each child. They gave the teacher time to talk about what the child was interested in doing. The play plans also provided time to talk about what the children had drawn. Although the play plans required ten to fifteen minutes to complete,

once teachers really began using them, they found that the time was well spent. After using plans for only the dramatic play area, many of our teachers ended up using them at other times because they helped children to practise self-regulation in a number of contexts.

## SCAFFOLDED WRITING

Scaffolded Writing is a technique invented in the Tools of the Mind project by applying the ideas of the orienting basis of activity, external mediation, private speech and shared activity (Bodrova & Leong, 1996; 1998b). In Scaffolded Writing, a teacher helps a child plan his/her own message by drawing a line to stand for each word the child says. The child then repeats the message, pointing to each line as he or she says the word. Finally, the child writes on the lines, attempting to represent each word with some letters or symbols. During the first several sessions, the child may require some assistance and prompting from the teacher. As the child's understanding of the concept of a word grows, the child learns to carry the whole process independently—self-scaffolded writing—including drawing the lines and writing words on these lines.

The figures appearing at the ends of chapters show how Scaffolded Writing influences writing development. Figure 7 shows a kindergarten-aged child's writing prior to using Scaffolded Writing. Figure 8 shows his first attempt to use scaffolded writing with teacher assistance and Figure 9 shows the same child's self-scaffolded writing two months later.

Through our research, we found that Scaffolded Writing must be implemented differently for children, depending on their background knowledge about literacy. While the major components of Scaffolded Writing—child-generated message, line as an external mediator, private speech engaged during the writing process—remain unchanged, the contexts in which the technique is introduced and then practised might differ. In addition, the particular order of steps children follow when progressing from teacher-assisted Scaffolded Writing to using self-scaffolded writing may also vary.

All children watch the teacher model the use of Scaffolded Writing. The teacher models that the words convey a message and shows the children how to plan the message using the lines. The teachers use messages designed to highlight different aspects of literacy, changing the emphasis as the year progresses. For example, many messages modelled early in the year are used to just reinforce the relationship between spoken and written language—they might be about what is for lunch or what children will do on a particular day. When children are already using the lines on their own, modelled messages highlight meta-linguistic features of words, such as long and short words, or words that

begin with the same sound. Later, the modelled messages are used to teach sound-to-symbol correspondence.

If children have little literacy knowledge, the child's own use of scaffolded writing occurs in specific contexts such as their play plans. The message written usually starts with a stem, such as 'I am going to' or 'My plan is'. After using the stem in the first sentence, children can go on and add more sentences. Children are encouraged as quickly as possible to make their own lines to represent each of the words in their own oral message. At this stage, the teacher focuses on learning voice-to-print match by emphasizing that each word spoken has a corresponding 'line' or representation. A second emphasis is on the idea that writing carries a message. The fact that letters represent sounds is discussed, but children are not expected to write letters and words. They are asked instead to use whatever they wish to help them remember the message—a scribble, a letter-like form or a letter.

When children are familiar to some degree with letters and letter-sound relationships, the procedure adopts a more directed format. This is an evolving process and is individualized to fit the child's emerging skills. The child dictates the message, the teacher draws the lines to stand for the words, and then both the child and the teacher repeat the message, pointing to the line as they say each word. Once the child can repeat the message, the child attempts to write words on the lines. After several sessions of teacher-assisted scaffolded writing, the child is encouraged to try planning the message with the lines all by him/herself. Children are encouraged to write long and complete oral messages to prompt attempts at encoding or writing as many different sounds as possible. Children have a special alphabet chart, called a 'sound map', to help them find the corresponding letter if they do not know it.

At this more advanced stage, children are asked to reread their messages to the teacher after they have finished writing on their own. At this time, the teacher and the child will work on 'editing' the message. Editing consists of working on a certain aspect of literacy at the assisted level. For example, when a child has one phoneme represented in each word of the message, the teacher will help the child hear more sounds by drawing out one of the words. If a child has represented more than one phoneme in the word, the teacher will work on another missing phoneme. In addition, the teacher may reinforce meta-linguistic concepts already introduced in modelled messages. Editing is very individualized and requires that the teacher be very knowledgeable about patterns of literacy development and what kind of assistance would work best with a specific child. At this point, 'estimated spelling' (spelling that is phonologically accurate but not conventionally correct) is acceptable and conventional spelling is not emphasized.

# Description of the Early Literacy Advisor

To facilitate the transfer of expert knowledge to the classroom teacher, the Tools of the Mind project developed the ELA system with Dr Dmitri Semenov. Dr Semenov is an expert in mathematical modelling of psychological processes and in the design of artificial intelligence systems. The ELA is conceived as an advisor to the teacher—helping the teacher to assess children more effectively, to analyse assessment data, and to make choices between a number of appropriate teaching techniques. Teachers receive expert advice in the form of individual student profiles that make possible a truly individual approach to address the unique needs and strengths of each student.<sup>1</sup>

Each profile has four parts that could be printed out in any combination. The first part contains the report on the student's performance in a test (such as an overall score and the specific items answered correctly or incorrectly). The second part contains the analysis of error patterns detected in the student's performance. The third part provides the interpretation of these error patterns. The fourth part lists instructional strategies recommended for this particular student.

Expert knowledge derived from research and collective expertise of master teachers is built into each component of the student profile, so that teachers will receive accurate and research-based information. Without fully understanding the expert knowledge behind the recommendations, teachers can still use effective instructional recommendations that would otherwise require attending many hours of in-service training. However, for those teachers who want to become experts themselves, the student profiles provide detailed information about developmental trajectories in literacy acquisition and specific error patterns.

The major components of the ELA include a battery of early literacy assessments, a set of instructional strategies, and computer software designed to interpret the results of the assessment in terms of student literacy development and recommended interventions.

## THE ELA ASSESSMENTS

The battery of assessments consists of instruments that target the skills and concepts most critical for early literacy development along with the development of meta-cognitive and meta-linguistic skills. The design of the ELA instruments is based on the Vygotskian principles on the ZPD and scaffolding, and combines assessment of a child's independent performance with the assessment of the child's ability to respond to the teacher's assistance.

An authentic assessment, the ELA uses game-like formats and activities similar to what children would experience in school. Unlike on the typical machine-scored answer sheet used in many assessments, children are not asked to 'bubble in' their answers. Since the assessment battery is designed for non-reading children and emergent readers, adults record the child's actual response on special forms (student response protocols). These forms are then scanned into the computer and processed to generate individual student profiles.

## THE ELA INSTRUCTIONAL STRATEGIES

The set of instructional strategies contains new strategies developed within the Tools of the Mind project along with other instructional strategies empirically proven to be effective in supporting early literacy development. Instructional strategies are recommended on basis of the 'window of opportunity' for each strategy estimated to be most beneficial for an individual child. Thus, depending on the assessment results, different strategies could be recommended for different children. To make the strategies' implementation more feasible, similar strategies are grouped into larger categories to be recommended for groups of children with similar instructional needs.

## THE ELA EXPERT SYSTEM

The core of the ELA is a proprietary artificial intelligence engine that combines pattern analysis algorithms with an expert system. The expert system is programmed to emulate the decision-making process of master teachers by making connections between an individual student's raw assessment data and effective instructional strategies that are most likely to benefit a particular student at a specific time. In addition, the expert system defines where a child is in the developmental trajectory and estimates the range of skills that will be emerging next. It also identifies the patterns of a child's errors that can be critical in attaining the next milestone in the child's development. The modular design of the expert system makes it applicable to other subject areas and grade levels, but it was first adapted to early literacy instruction.

Thus, the ELA is a logical outgrowth of the previous developments in the Tools of the Mind project designed to facilitate the delivery of its theoretical foundations and effective instructional strategies to classroom teachers. The ELA has been field-tested on over 3,000 children in various samples ranging from pre-kindergarten to Grade 1. Teachers who have used the ELA in their classrooms have found it easy to administer and engaging for the children.

The ELA has been correlated with a general set of standards and benchmarks derived from the most current research on literacy as well as from state documents, documents from professional organizations with set literacy standards, and research reports (e.g. National Reading Panel, 2000; Snow, Burns & Griffin, 1998). From this body of information, a set of general standards and benchmarks were compiled as well as a set of developmental patterns.

## DESCRIPTION OF DISSEMINATION MATERIALS AND TEACHING VIDEOS

To increase public knowledge about Vygotsky and the principles on which this project was built, we wrote a book, *Tools of the mind: the Vygotskian approach to early childhood education* (Bodrova & Leong, 1996) and participated in the creation of a video series on Vygotsky with Davidson Films. Three of the teaching videos cover a general introduction to Vygotsky, the role of play in development, scaffolding, and the tactics that are used in teaching—external mediation, private speech and shared learning. The fourth video, which covers literacy, includes much of the Vygotskian approach to the development of literacy.<sup>2</sup>

FIGURE 6. Play plan by Krystine in May



# Implementation of the innovation

The implementation of the Tools of the Mind project can be divided into four phases. The first phase involved our preliminary attempts at adaptation of the Vygotskian approach to the classroom and the creation of new strategies that better fit the American classroom while staying true to Vygotskian theoretical foundations. In the second phase, we attempted to train a large number of teachers to use these strategies. In the third phase, we evaluated the effects of our approach on student achievement and experimented with methods of training teachers. In the fourth phase, we further developed the computerized assessment system, continued to develop strategies and applied them in more diverse settings. In this phase, we worked on aligning the assessment with standards and benchmarks.

## PHASE I: ADAPTATION OF VYGOTSKIAN-BASED STRATEGIES TO THE AMERICAN CLASSROOM

The Tools of the Mind project first implemented Vygotskian activities in two classrooms, a mixed-aged classroom with children from kindergarten to Grade 2 (5-7 years of age) and in a large kindergarten class that had three teachers in a private school. Each teacher had more than ten years of classroom teaching experience. These teachers had shown an interest in the techniques and had volunteered to participate.

As we began to implement the strategies, we discovered that many of them did not work when they were imported directly into classroom practices. The classroom practices and the content taught differed substantially. For example, training teachers using the same method to teach reading skills did not translate from Russian to English without major changes to accommodate a different language system. Also, the curriculum in kindergarten and Grade 1 was not the same in different countries. Children in the United States were actually introduced to reading earlier than in the Russian Federation. American children are allowed to attempt to write using 'estimated' spelling before they know all of the sound-to-symbol correspondences and prior to reading, while Russian children are taught to write conventionally from the very beginning. We had to adjust Vygotskian activities so that the content in the activities was meaningful, and we had to synchronize them with American expectations for children of this age. Many of the Russian activities were designed for children who were developmentally much older than their American counterparts, although the learning tasks were similar. Thus, even the level of directions re-

quired to complete the task had to be changed to meet the developmental level of American children since younger children's memory skills are not as advanced.

As a result, we began to create new techniques that used Vygotskian principles but that addressed the needs of American children. Luckily, we were working with a wonderful group of very thoughtful teachers who were able to help us adjust the activities to meet the needs of the American classroom. In fact, these teachers had much higher degrees and more education than teachers in the Russian Federation of equivalent grade levels. This made modifications of our programme much easier. Finding a strong group of practitioners with inquiring minds was crucial to this phase of our project and proved to be very important all the way along.

## PHASE II: LARGE-SCALE IMPLEMENTATION AND TEACHER TRAINING

In 1996, we began a massive implementation of our programme in a large urban school district. We worked with seventy-eight teachers in teams in eight schools. The teachers taught pre-school (4-year-olds), kindergarten (5-year-olds), Grade 1 (6-year-olds) and Grade 2 (7-year-olds). We met with small groups of teachers and support staff (special education teachers, reading specialists) for a one-hour session. These sessions were scheduled so that we were able to meet with all seventy-eight teachers once every three weeks. In addition, trained district staff developers provided support in the classroom.

The intensive training process involved in this phase was very time-consuming and yielded inconsistent results. We did not have a full-blown curriculum with teacher manuals and activity kits, and so it was more difficult for teachers to implement our techniques. Teachers who understood and learned the Vygotskian approach did better at implementing the techniques in the classroom. When we gave specific suggestions to teachers, such as after child evaluations, teachers were better able to implement suggestions. Using the assessment data as the basis for teacher training was even more successful than watching the teachers' videotapes of classroom problems. This led us to the idea of making the assessment more closely tied to teaching strategies and developmental patterns.

At the end of the year, the school district administration was reluctant to have the entire project evaluated and blocked the final assessment. The district felt that the assessments should only be given to the children who would pass the test. Otherwise, they argued, it was too painful and difficult for the children. Thus, we were not able to complete an empirical study or even an eval-



uation of our programme. We learned that the word ‘evaluation’ had different meanings for researchers and school district staff and that this had to be negotiated at the beginning of the project.

However, of the children we were allowed to assess, we found that in those classrooms where our Vygotskian-based programme was faithfully implemented, the children’s progress was very strong, much greater than expected. All of the children progressed relative to their initial literacy levels. In addition, progress outweighed the effects of demographic—African-American and Latino students did as well as their Caucasian and Asian counterparts.

During this phase we developed our first three videos.

### PHASE III: EVALUATION OF TEACHING STRATEGIES

Realizing the need for a complete and real evaluation of our programme, in Phase III we began an empirical study using control and experimental groups. We narrowed our focus to kindergarten with a small pilot sample of pre-schools. For the kindergarten study, we worked with a small district with a large population of at-risk children. The plan was to have a six-month trial (January to the end of school) and evaluation of the programme. The pre-school programmes were in an urban district.

This marked the first large-scale use of the computerized assessment system. It required that all of the children’s assessments (control and experimental) be analysed within a week. By this time the system could analyse an individual protocol and produce a profile in five to ten minutes. More than 500 protocols had to be scanned and analysed in the course of a few weeks. Just the logistics of working this out showed that the computerized assessment system could handle a large volume and still perform flawlessly. The procedures used in this phase of the project and the results of the study are described in the section entitled ‘Evaluation’.

The implementation was more successful than we had expected. The children had benefited greatly from the project; even the large number of non-English-speaking students had progressed during the six months to a greater extent than those in the control group. The techniques were successful with at-risk populations. We believed that a more intensive effort would prove them to be even more successful.

The introduction of the computerized assessment allowed us to give less support compared with Phase II, but we obtained more potent results for children. Thus, tying the techniques directly to the assessment speeded up implementation of the teaching strategies.

When we statistically controlled for fidelity to the programme, we found that those teachers who were most faithful in the implementation of the pro-

gramme every week were the ones who had the strongest results, even though their children as a whole began the year at a lower level. These teachers had the greatest gains overall.

In this phase we came across several unexpected problems due to the population we were working with. In some classrooms, 30–60% of the children who began the school year left before the end of the year. A significant number of children were absent for substantial amounts of time—for weeks and months. This complicated issues such as the child’s exposure to the techniques as well as data collection for the evaluation.

#### PHASE IV: CONTINUED DEVELOPMENT OF THE ELA AND ALIGNMENT WITH BENCHMARKS

During this phase, we moved our project to McREL (Mid-Continent Research for Education and Learning), one of ten regional educational laboratories sponsored by the Office of Educational Research and Improvement (OERI) of the United States Department of Education.

The move to McREL increased development of training materials and the degree to which both the assessments and techniques addressed state and national standards for early literacy. This occurred at a time when the field of early childhood education underwent a move to more accountability and the need to address child outcomes. McREL is known nationally for its work in school reform and the development of standards; McREL staff made valuable contributions to the original Vygotskian-based techniques and assessments. At this time, we divided our project into three parts:

- Technique development;
- Dissemination and distance learning; and
- Test and computerized assessment development.

##### *Technique development*

We began to work intensively in only two model classrooms as the sites for the development of techniques. We could closely interact with both teachers and children and could receive constant feedback. From this effort, we developed a more coherent curriculum with activities covering more of the components of a pre-school or kindergarten daily programme. With the support of nationally known consultants in reading and early childhood education, the techniques continue to improve and develop as new problems arise.

##### *Dissemination and distance learning*

The computerized assessment programme, which included assessments and techniques, became one of the products offered by McREL to school districts

across the United States. The ELA is being used in thirty districts as the accountability measure for kindergarten. Distance training of teachers using the ELA has begun. In addition, we worked with Davidson Films to complete our fourth video to teach early childhood educators about literacy.

### *Test and computerized assessment development*

Test development included setting numerical indicators for the benchmarks using the ELA and the correlation of the assessments with standards and benchmarks. The Best Teachers with At-Risk Children Study, completed in 1999, established numerical indicators for the assessment profiles. For this study, a group of teachers were chosen because of high child achievement scores and school district recommendations. The teachers in the final sample were teaching in schools with a history of very low test scores on standardized assessments in the upper grades and a large number of at-risk children. The computerized assessment was administered at the beginning and at the end of the year. Teachers received all developmental information but did not receive any information about techniques and strategies. The study was designed to identify how far during one year good teachers were able to take at-risk children.

In addition to test development, we have been engaged in an intensive survey of the literature that has resulted in a compilation of the standards, benchmarks and developmental patterns in the area of literacy. These developmental patterns have been used to refine the profiles that were generated from the assessments. The compilation has also been posted on the web for states and school districts to use when setting their own standards.

The primary problem at this time is establishing a stable base of funding for the project. Because the approach to literacy development advocated in the project is not mainstream, it has been difficult to obtain funding through traditional avenues.

# Evaluation: selected experimental studies

## KINDERGARTEN EVALUATION DATA

In January 1997, the Tools of the Mind project began collaboration with a public school district to improve the underlying cognitive and early literacy skills of kindergarten students. The study was conducted with ten kindergarten teachers—five experimental and five control. Each teacher had two sessions—in the morning and in the afternoon. Each session had twenty to twenty-five students. There were a total of 426 children in the selected schools—218 children in the project classrooms and 208 in non-project classrooms. Experimental and control classrooms were selected so that demographic characteristics of students as well as teachers' educational background and teaching experience would match. In addition, all kindergarteners in the district were given a writing test prior to the beginning of the study. The analysis of the writing samples collected allowed us to make sure that children in the experimental and control classrooms did not differ significantly in their early literacy development.

Teachers implemented three teaching techniques: Scaffolded Writing, written learning plans and sound analysis (using Elkonin boxes and the sound map). We estimate that this comprised (in the best case) about 10% of the classroom instructional time per week. A staff member was assigned to each of the project teachers to assist him/her in implementing these techniques and to collect samples of the children's work. These aides were available for each of the project teachers for one day a week.

To compensate for the extra time during which an aide was available to work with children in the project schools, project staff spent one day a week in the non-project schools doing whatever the teacher asked them to do. For some teachers, this meant reading or writing with the children. In other cases, the staff member freed the teacher up to do other things. In only one case was the aide asked to not participate in the classroom, and so she sat on the sidelines.

Both children in the project and non-project schools attended the IBM *Write to Read*® lab, a computerized phonics programme. Children in the non-project schools had a literacy period during which they practised writing, looked at books or read a story. This was similar in all kindergartens. Both project and non-project schools were held accountable for a specific set of crucial skills. Children were also assessed using a district-wide assessment.

Children were assessed twice—at the beginning of the semester (January) and at the end of the semester (May). Both times testing was done during a one-week period. Assessments were administered primarily by undergraduate college students majoring in education. About 40% of the children in the project schools were assessed by their teachers. Of all the children participating in the study, 231 were assessed on all assessments—pre- and post-tests. In addition, for some children partial pre- and post-test data were available (e.g. January and May data on the sound-to-symbol correspondence test were collected for 316 children). The significant decrease in the number of children tested in relation to the initial sample size can be attributed to a high turnover rate and high absenteeism typical of urban school districts.

All of the assessments, except the writing sample, were administered in a one-to-one session that lasted about twenty minutes per child. When the writing sample assessment was administered, children began writing in a large group, and then as each child finished, the tester would have the child read his/her writing on an individual basis. Five assessments were given in the pre-test and these five were repeated with two additional assessments in the post-test. The assessments used both for pre- and post-tests were letter recognition, sound-to-symbol correspondence, words versus pictures, instant words and writing sample. Reading concepts and the Venger Graphical Dictation Test, which measured self-regulation, were only administered in spring (Venger & Kholmovskaya, 1978).

Assessment data were analysed using S-Plus statistical software. General accuracy scores were calculated for four assessments: letter recognition, sound-to-symbol correspondence, words versus pictures and instant words. Multiple scales were used to analyse the writing sample and reading concepts tests.

The scales for the writing sample analysis included *scribbling versus writing*, *number of words*, *message complexity*, *word complexity*, *message decoding*, *controlled vocabulary usage*, *accuracy of word encoding*, *completeness of phonemic representation*, *correctness of phonemic representation* and *concepts of writing*. The scales for the analysis of the reading concepts data included *voice-to-print match*, *concept of a word*, *concept of a sentence* and *comprehension*.

Owing to the time-consuming nature of the manual coding involved in the analysis of the Venger graphical dictation test, analysis of the data collected with this instrument was not completed.

## RESULTS

On all pre-tests, the children in the project and non-project schools had very similar distributions on all assessments. Thus, project and non-project samples did not differ statistically on any measures before the introduction of the innovative teaching techniques.

Comparisons of the pre-test and post-test results between the project and non-project schools were made. The students of the project schools demonstrated both higher levels of performance and faster rates of progress than the students of the non-project schools. Significantly stronger growth was documented in several pre-literacy variables most closely associated in the literature with reading achievement in later grades. Overall, children in the project schools performed at higher levels on all measures. In no case did the techniques have a negative effect on development on any scale.

Statistically significant differences between project and non-project classrooms in the area of writing included:

- The number of words written by children who were not writing on the pre-test;
- The number of words written by children who were writing some words on the pre-test;
- Increase in the complexity of the child's written message;
- Better correspondence between the written story and the re-read of that story by the child;
- More consistent use of writing conventions;
- More words that are new and fewer words from controlled vocabulary;
- More accurate spelling; and
- Better phonemic encoding of words that are not a part of the controlled vocabulary.

Statistically significant differences between project and non-project classrooms in the area of pre-reading competencies included:

- Improvement in sound-to-symbol correspondence;
- Better voice-to-print match;
- Better understanding of the concept of a sentence; and
- Better understanding of the symbolic function of a printed word.

In the following areas no statistically significant differences were found between project and non-project classrooms: letter recognition, instant words and words versus pictures. Two of these assessments—letter recognition and words versus pictures—proved to be too easy for most of the children by the end of the year to reliably discriminate between those who made greater progress and those who did not. The instant words measure, on the other hand, appeared to be too difficult even for the end of the year assessment: the median post-test result was only three words recognized out of 100 administered.

Given the comparable performance of children in the project and non-project schools on measures of letter recognition and sight words, the difference in writing at the time of the post-test is even more indicative of the specificity of the techniques used. Although children began at the same initial levels, chil-

dren in the project schools demonstrated significantly higher levels of writing—a strong argument for the effectiveness of Scaffolded Writing, written learning plans and sound analysis.

## PRE-SCHOOL DATA

The pre-school project compared two teachers using the Tools of the Mind curriculum with two control classrooms. In project schools all of the children were included in the study, while in non-project schools only about half—those who had permission slips from their parents to be tested—participated. There were a total of seventy-five children in the selected schools, fifty-three children in the project school and twenty-two in non-project schools. All of these children were assessed on all assessments pre- and post-tests. Three assessments—letter recognition, sound-to-symbol correspondence and words versus pictures—were given in the pre-test and these three were repeated in the post-test with the addition of the reading concepts assessment. The pre-test was given in January and the post-test in May.

Assessment data were analysed using S-Plus statistical software. For three assessments—letter recognition, sound-to-symbol correspondence and words versus pictures—general accuracy scores were calculated. For the reading concepts assessment, data were analysed using four scales: voice-to-print match, concept of a word, concept of a sentence and comprehension.

In project classrooms, teachers implemented two teaching techniques: Scaffolded Writing and play plans. These two strategies were typically implemented in a combined fashion and required ten minutes of classroom time daily.

Since the adult-child ratio was higher in pre-school classrooms than in kindergarten classrooms (two adults per eighteen children in pre-school compared with one adult to twenty children in kindergarten) no additional personnel were placed in either project or non-project classrooms.

## RESULTS

Since the sub-sample of children from non-project schools was ‘self-selected’ in the sense that only children whose parents signed permission slips were included, the following procedure was used to make project versus non-project schools comparisons meaningful.

Each child from a non-project school was paired with a child from a project school so that their pre-test scores on letter recognition and sound-to-symbol correspondence tests were as close as possible. This step resulted in twenty-two pairs. On the post-test, data were compared for these twenty-two pairs of children.

The results for both pre- and post-tests are reported for the following measures: letter recognition, sound-to-symbol correspondence and words versus pictures. The reading concepts test was used to compare children from project and non-project schools on the post-test only.

The children in the project school showed statistically stronger growth compared with children in non-project schools in many pre-literacy variables closely associated in the literature with reading achievement in later grades. In no case did the techniques used have a negative effect on development on any scale. Statistically significant increases included:

- Improvement in letter recognition;
- Better sound-to-symbol correspondence;
- Better comprehension of pattern in a text;
- Better understanding of the symbolic function of a printed word; and
- Better separation of a printed word into its component letters.

Thus, the statistical analysis of the results for both groups (kindergarten and pre-school) proved that the innovative teaching techniques used in the project classrooms produced gains in children's early literacy development beyond what was accomplished by the teachers in non-project classrooms. In the absence of comprehensive normative data on literacy development for this age group, it is difficult to evaluate the magnitude of these gains. However, data reported by many researchers in the field suggest that the results demonstrated by the children in the Tools of the Mind classrooms exceed expectations for the respective grade levels, given the demographic characteristics of the samples.

While the data collected provide strong evidence of the innovation's short-term effects, there is not enough data to demonstrate its long-term effects. Collection of follow-up data was made difficult by the fact that participating schools use different instruments to assess reading and writing achievement beyond kindergarten, and thus students' scores could not be compared. The state of Colorado, however, mandates that all fourth graders take the same achievement test. As the two cohorts participating in the study will take this test at the end of fourth grade, we will be able to compare reading and writing scores for children who were initially in project and non-project classrooms.

Although longitudinal data are yet unavailable, teachers' reports provide some encouraging evidence of lasting effects of the innovative teaching strategies on the students. Teachers from the project classrooms quote first and second grade teachers who notice that students who participated in the study are usually more self-regulated learners, express more interest in writing and reading, produce more writing than their peers, and demonstrate mastery of reading and writing at higher levels.



# Impact

The reaction of the teachers involved in the project was mainly positive. The teachers who were more intensively involved in the project, and consequently whose results were better in terms of their students' achievement, continued to implement the instructional strategies they learned in the project even if they received less support or no support from the project staff. Their students' scores continued to improve. For example, when the school district began mandating standardized assessments in kindergarten, 97% of students in the project classroom scored at the 'proficient' level, while the average level for the district was 50%. The following year, when the district results were reported in terms of grade levels, students in this classroom scored between 1.4 and 1.8 at the moment of testing. This means that their literacy level in the eighth month of their kindergarten year equalled what was expected by the district to be accomplished only in the fourth or even eighth month of Grade 1. These results are especially impressive given that in this classroom one-third to one-half of the students started the year with limited English proficiency and would usually be placed in an 'at-risk' category on the basis of their socio-economic and demographic characteristics. Teachers attributed their success to the new instructional strategies they were using.

Impact on the local level also included interest and growing support from the school administration. The teachers who participated in the project were invited to speak at local and national conferences and to describe their experiences in articles addressed to classroom teachers.

It is hard to isolate the impact of the innovation on the larger educational community from the impact of other events that were taking place at the same time. However, there is some indication that the scope of the impact of our project has been substantial. For example, the videotapes that explain the theoretical foundations for the project and demonstrate some of the instructional strategies used in project classrooms are currently used in more than 900 colleges and universities nation-wide in their teacher preparation programmes. Local educational agencies and school districts also use the innovations for their professional development workshops. *Tools of the Mind*, which describes the philosophical foundations and the theoretical principles underlying the instructional strategies, remains one of the best-selling books on the subject. We have been invited to speak on early childhood assessment at the national office of the Head Start programme.

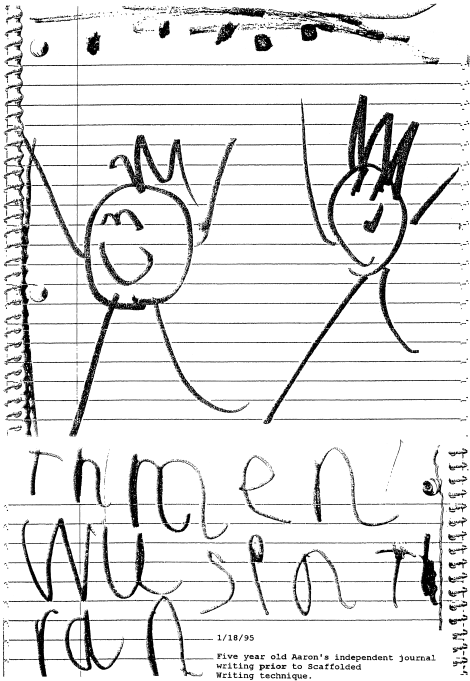
The greatest unintended consequence of the project has been increased awareness in the educational community about the potential for early literacy

in pre-school and kindergarten. In our model classrooms, children demonstrate that they can go far beyond current expectations for their age group. In one classroom, which has a particularly high number of at-risk non-English-speaking children, all of the children exceeded the district kindergarten expectations and scored at the Grade 1 level. This was the first time in the district that children from a classroom with this demographic make-up had performed so well.

In addition, the developmental patterns and benchmarks developed in the course of creating the ELA are now being used by other states and school districts to set expectations and standards for young children. As these have been posted on the Internet, the number of people who are interested in them has grown.

Finally, since so many school districts have begun to use the ELA, we have had a chance to collect data from diverse populations in a way we never could before. We are now collecting data from many different types of schools, and we have data from teachers with different levels of implementation to help us refine our tools.

FIGURE 7. Five-year-old Aaron's independent journal writing prior to Scaffolded Writing technique.



## Future prospects/conclusions

Currently, we are working in several arenas. First, we are establishing the reliability and validity of the ELA for younger children through a study of 340 children in a Head Start programme. Head Start is the federally funded early childhood intervention programme for at-risk children. This empirical study will not only show the validity of the assessment battery, but will also validate a number of special early childhood teaching strategies designed to improve both self-regulation and foundational literacy skills. The teaching strategies are heavily play-based and lead into the kindergarten curriculum we have already developed. This study will be completed in June 2001.

We are increasing the quality of the distance training provided through the computerized assessment programme by creating CD-ROM-based training clips to be used in the current training model and eventually to be housed on the Internet.

We have begun to explore the use of the techniques with non-standard-English speakers (African-American Vernacular English) and with non-English-speaking populations (immigrant populations from a number of countries). One of the most interesting results of the last four years of work is that these children make substantial progress in our programme, much more than those children who begin at similar levels without our interventions.

A site licence version of the software system was developed and has been used in thirty school districts, assessing over 1,000 children. In total, the assessment has been administered in various forms for over 3,500 children, and these have all been analysed by computer. This fact shows the promise of the use of the computer as a support to the teacher instead of merely as a teacher replacement. Instead of directly teaching the children, the computer is used to help teachers decide what children need to learn next.

In addition, advances in computer technology have been and will continue to be incorporated into the ELA computer system. For example, the assessments are all JAVA-based, so that they are platform-independent. We will have an Internet-ready version of some assessments available within the year. We are exploring additional kinds of data entry—other than scannable forms—that would still be user-friendly.

The story of the Tools of the Mind project does not end here. We continue to apply the Vygotskian approach to help young children and their teachers. In the future, we hope to extend the types of tools we develop to older children and to other areas of learning.

FIGURE 8. Aaron's writing after the teacher helped him to use the Scaffolded Writing technique.

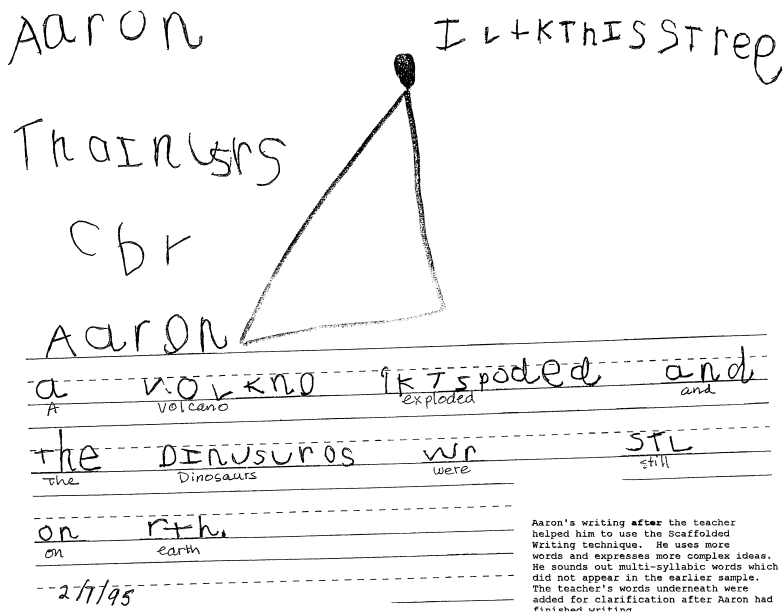
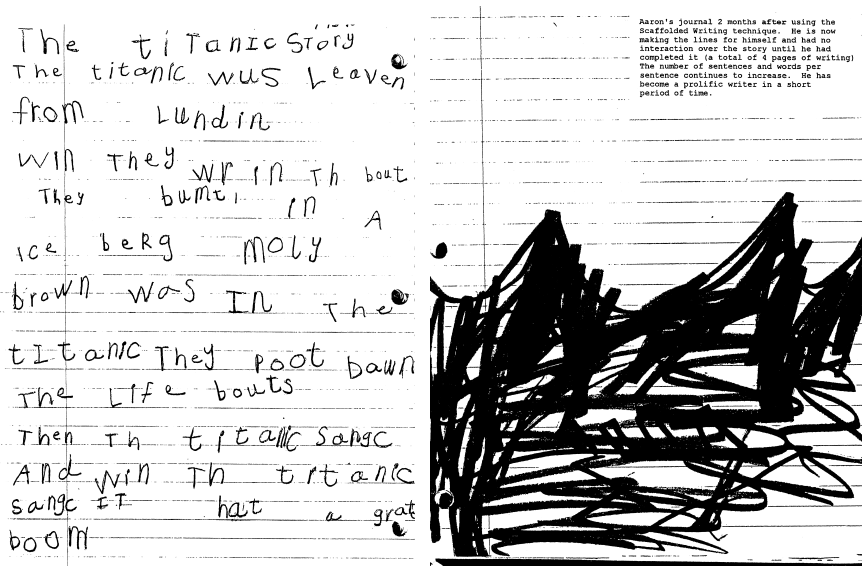


FIGURE 9. Aaron's journal two months after using the Scaffolded Writing technique.



# Notes

1. <http://www.mcrel.org/resources/literacy/ela>
2. The titles are *Vygotsky's developmental theory: an introduction*; *Play: a Vygotskian approach*; *Scaffolding self-regulated learning in the primary grades*; and *Building literacy competencies in early childhood*. See <http://www.davidsonfilms.com>

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# Teacher Observations on the Implementation of the Tools of the Mind Curriculum in the Classroom: Analysis of Interviews Conducted over a One-Year Period

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The following pilot study reports on teacher observations and reflections of implementing the Tools of the Mind curriculum in pre-k and kindergarten classrooms in an east coast urban school district in the US. The study followed five teachers over the course of a school year. Structured interviews were conducted with each teacher individually shortly after Tools of the Mind teacher training sessions took place. The analysis reports on themes that emerged in these conversations. Findings address; challenges the teachers faced in implementing the program, training issues, and the effectiveness of the program in supporting children's intellectual and social skills.

**Keywords:** Curriculum; Preschool Education; Early Childhood Education; Learning; Social Development; Self-Regulation

## Introduction

The Tools of the Mind (hereafter Tools) curriculum is relatively new to the US. Its developers, Dr. Elena Bodrova and Dr. Deborah Leong, are based at Metropolitan State College of Denver, Colorado and have been working together on the Tools curriculum since 1993 according to their website ([www.toolsofthemind.org](http://www.toolsofthemind.org)). Over the past decade Dr. Bodrova and Dr. Leong have been successful in enlisting a number of school districts to adopt the program, as well as provide professional development training to teachers in those schools (Bodrova & Leong, 2007). The Tools' website currently notes that the curriculum is being implemented in Colorado, Florida, Maine, Massachusetts, New Jersey, New Mexico, North Carolina, Oregon, Pennsylvania, Tennessee, Texas, and Washington<sup>1</sup>. With a little over a decade of use in public schools here in the US, there are still only a small number of studies that attest to its effectiveness and outcomes (Diamond & Lee, 2011; Bodrova & Leong, 2003, 2005a, 2005b, 2006; Barnett, Jung, Yaroz, Thomas, & Hornbeck, 2008), and none have specifically addressed the concerns and experience of the teachers who are in the early phases of implementing the program.

The history of educational curriculum and pedagogy in American public education is nearing its bicentennial year since the establishment of public schools outpaced private schools in the late colonial era, circa 1840, and the publication of the McGuffey Readers—the first grade-level reading text books widely used in 19th century America. The evolution of the field is marked by many milestones. Creation of a robust educational publishing industry and the creation of the educational software industry utilizing multiple pedagogical approaches are two examples of significant innovations. The portfolio of curriculum content for consumption by K-12 schools continues to

grow. However, only a subset of these educational materials represent design innovations which embody and reflect our growing understanding of cognitive and emotional development, or advances in our understanding of models of mind.

To illustrate this concretely, let's use the metaphor of the evolving automobile. If we compare and contrast a 1959 Ford with today's smart cars we can agree that both are forms of transportation which convey passengers from point A to point B. By design, smart cars are functionally more complex, more fuel efficient, are engineered to provide navigational direction and are sensitized to obstacles in their path, as well as being designed to protect occupants from a crash with special features. In short, the smarter car embodies collective advances in engineering technologies across disciplines and these are advances that passengers can see, touch, and feel. Most of us are witnessing and participating in this cultural evolution because automobiles are ubiquitous. By contrast advances in K-12 educational curriculum are not as easily understood or appreciated because the experience of going to school is uniquely that of the student—parents are onlookers who get to participate in the choice of curriculum materials only if they are willing to become active members of a parent/teacher association, or School Board committee. Family members are also observers of curricular change to the extent that they are actively involved in monitoring children's homework (Scott-Jones, 1995; González, Andrade, Civil, & Moll, 2001; Van Voorhis, 2003).

A brief recap of how changes in our models of mind are reflected in major milestones in curriculum materials over the past century helps to put the Tools of the Mind curriculum into perspective<sup>2</sup>. Starting with the late 18th century and early 19th century view of the child, schooling emphasized the study of religious texts, but home instruction also included reading,

<sup>1</sup>[www.toolsofthemind.org](http://www.toolsofthemind.org) accessed 06/06/11.

<sup>2</sup>See: Michael Fullan (2001). The new meaning of educational change. New York, NY: Teachers College Press.

writing, the Greek philosophers and mathematics. The corresponding model of mind that directed this choice of materials assumed the child needed moral guidance to mature as a productive member of society (Wishy, 1972). The accepted thinking about children's character was that they were born morally corrupted, and needed to be civilized through moral education first and foremost. The first inter-state association of teachers to rigorously advocate for early childhood education was The American Institute of Instruction, formed in Boston in 1830<sup>3</sup>. The Institute published one of the first periodic journals on teaching—the American Journal of Education. Many articles were dedicated to the importance of establishing early childhood education for all communities, regardless of class and wealth. Early Journal issues give first-hand accounts of how teachers struggled with making the transition from a model of crooked minds to that of the *tabula rasa*—the impressionable mind, then the developmental mind—the mind that grows to maturity in phases<sup>4</sup>.

The birth of the child study movement in the mid to late 19th century is often attributed to G. Stanley Hall. In terms of its impact on curriculum however, John Dewey most notably exemplified its ideas in practice. Dewey promoted experiential education that would enable children to learn theory and practice simultaneously. A modern day example of this is the practice of teaching elementary physics and biology to students while preparing a meal (Barron et al., 1998). At Dewey's lab school at Teachers College at Columbia University in the early 1900's, children built objects in wood working shops, they cooked meals, stitched and wove cloth, and generally practiced skills that adults engaged in as a form of parallel play which conveyed to children that they were engaging in socially meaningful activities that were more exploratory than exploitive work chores. Dewey also acknowledged Friedrich Froebel's significant contribution to the design of infant and nursery school toys (aka Froebel gifts)<sup>5</sup> and suggested the US model primary curriculum after Froebel's kindergarten<sup>6</sup>. While moral and ethical teachings were still considered important, defining age appropriate content and subject matter became the focus of educators. Moreover, the internal world of psychological development was beginning to exert itself as the determining factor in the design and production of books for public and educational consumption.

As cognitive psychology took root as theory taught in schools of education, teachers learned about stages and phases of the child's mental growth in their training. These ideas were further refined by Jean Piaget in observations and research<sup>7</sup>. The notion that conceptual changes in thinking were closely allied with physical maturation was another milestone which influenced curriculum development. Montessori, Waldorf schools and the Reggio Emilia system all evolved in tandem during the

early to mid 20th century under the prevailing belief that children are formed in large part by their early life experiences. While the philosophy of teaching varied among the three pedagogues above, they all shared a special attention to detail in the design of learning environments and created rich imaginative play spaces for children in the early primary grades.

During the second half of the 20th century experimental psychology began to influence academic thinking with cognitive information processing models of mind (Broadbent, 1958; Newell & Simon, 1972). These theories focused on the atomistic analysis of how the brain acquires and processes new information, and shed light on how short term memory and long term memory were two different but overlapping activities of the brain; repetition and reflection being key to remembering facts and figures long enough to do well on a test. The information processing model of mind resulted in a renaissance of workbooks for every school text book, along with a resurgence of repetition and drill for K-12 education.

As theories of instruction began to evolve (Bloom & Krathwohl, 1956; Bruner, 1960, 1966, 1996; Kalantzis & Cope, 2008) curriculum choices multiplied, each reflecting different models of mind with the added dimension of using new media as a delivery system for instruction. In 1995, Tyak & Cuban wrote that the idea of steady progressive educational reform had met its end in the 1970s<sup>8</sup>. Perhaps another way of saying this is that the pluralistic choice of curriculum that sprang into existence over the latter part of the 20th century has made it more difficult for school administrators to convince parents and their communities that there is only one way forward in the name of education progress.

Historically, we can see schools have vacillated between pedagogy that offers highly structured, or drill and practice curriculum emphasizing the mastery of content, with seemingly less structured constructivist child-centered learning environments that value community building and social skills as much as the development of academic skills (Hmelo-Silver, Duncan, & Chinn, 2007). This tension still lies at the crux of curriculum choice for school administrators, especially for pre-k and kindergarten classrooms. Setting aside the No Child Left Behind Act<sup>9</sup> as a factor influencing decision making, education leaders need to analyze and interpret educational research about curriculum design just as medical professionals, legal professionals and engineers re-evaluate their practice relative to new data.

One way of defining progress that informs curriculum choice is to pay close attention to cross disciplinary research on the evolving understanding of mind from multiple perspectives: cultural, psychological, cognitive and neurobiological. The Tools program is based primarily on Vygotsky's (1986) ideas about the use of play as a catalyst for psychological and cognitive growth; however neuroscience research can also be cited for supporting the approach the Tools has developed. Neuroplasticity tells us that individuals are engaged from infancy onward in a unique experiment in scaffolding meaning making, one sound, one interaction, one image at a time (Pascual-Leone et al., 2005; Doidge, 2007; McEwen et al., 2011).

The main distinction of the Tools program from other pre-k curriculum is that it offers a more complicated model of mind

<sup>3</sup>[http://en.wikipedia.org/wiki/American\\_Institute\\_of\\_Instruction](http://en.wikipedia.org/wiki/American_Institute_of_Instruction) accessed 03/30/11.

<sup>4</sup>*Infant Schools*, American Journal of Education online, June; 3, 6 (1828); *Education of Infant Children*, American Journal of Education online July; 3 7 (1828); *Pestalozzi's Letter on the Education of Infants*, American Journal of Education online, March; 1, 2 (1830); *Education of Infants—A case study*, American Journal of Education online, March; 1, 2 (1830); *Address to the National Teachers Association*, American Journal of Education online, June 43 (1866).

<sup>5</sup>See <http://www.froebel.org.uk> for the history of Froebel and his method.

<sup>6</sup>Dewey, J. (1990) *The School and Society & The Child and the Curriculum* Chicago, IL; University of Chicago Press, centennial edition, p.116.

<sup>7</sup>See <http://www.piaget.org/aboutPiaget.html> for a full index of his writings. Accessed 04/02/11.

<sup>8</sup>Tyak, D. & Cuban, L. (1995). *Tinkering toward public school reform: A century of public school reform*. Cambridge, MA: Harvard University Press p. 13.

<sup>9</sup>No Child Left Behind Act, legislation adopted by the US Congress in 2001 See PL 107-110, [www2.ed.gov/lsec/leg/esea02/index.html](http://www2.ed.gov/lsec/leg/esea02/index.html).



in addition to addressing classroom organization, management, and curriculum materials. This is an important aspect of the program and its successful adoption by schools. It's also worth noting because it represents a qualitative change in the design of classroom curriculum much the way smart cars outclass the 1959 Ford under the hood. It is for this reason that teacher observations in the implementation of the curriculum is well worth studying. Our pilot study formally begins a dialogue about how teachers experience and view the impact of the Tools program in their classrooms and their professional development, in addition to suggesting future directions for research.

## Study Rationale

The relationship between preschool curriculum and later school success has been studied by Marcon (2002) with significant findings. Over a period of five years, Marcon tracked the academic progress of more than 300 children from an urban school district that had been exposed to three different types of preschool curriculum; child-initiated, academically oriented or directed, and a combination of the two. The results showed that preschool curriculum models did have an influence on children's later school achievement; students who had been involved with child-initiated curriculum had higher grades, and performed consistently better than the two other peer groups on academic tasks as they aged into and out of the elementary grades. What this tells us is that developing an internal locus of control and sense of agency in carrying out academic tasks matters, and it matters at a very young age. This appears to be an internal psychological disposition according to many educators, and very few public schools have adopted pre-k curriculum that address this goal in a serious way.

Enter, the Tools of the Mind curriculum. As mentioned above, Bodrova and Leong developed the Tools program in the 1990s and have been the sole medium of its dissemination; they are also evaluating the program (2001). Barnett et al. (2008) noted that "while child-centered, Tools emphasizes the teacher's role in guiding and supporting the child's learning... it does not fit neatly into frameworks that classify curricula as teacher-directed or child-initiated, child-centered or content-centered, and academically-focused or socialization focused" (p. 300). The program is highly structured for teachers, while at the same time emphasizes active participation in play for young students. In a recent journal article on educational media Verenikina (2010) observed that Vygotsky claims the prize as the most cited author in a review of current research. Although new to media studies, many in the field of education have long appreciated Vygotsky for the sociohistorical nature of cognitive growth and language development that he proposed, in contrast to Jean Piaget's more stage-stepped model of internal cognitive growth. Pea (2004) succinctly described the differences this way: "as Vygotsky would have it, psychological development progresses from an interpsychological to intrapsychological plane" (p. 426), i.e., learning precedes new internal categories to think with. Piaget surmised the opposite; that internalized construction of new schema forged by the individual makes new learning possible. The two theorists examine human development from different perspectives, Piaget through conceptual change, and Vygotsky (1986) through semiotic analysis of the socio-cultural environment the society provides. Wertsch (1985) portrays the three themes at the core of Vygotsky's

theoretical framework as an analytical technique: 1) a reliance on a genetic or developmental method; 2) the assumption that higher order mental processes in the individual have their origins in social processes and activities; 3) the exhortation that mental processes are only understood through the lens of the cultural tools and signs that mediate them. Vygotsky's ideas have been widely read in academia, and found enthusiastic reception in the application and design of software environments for middle, secondary school, and adult populations (Papert, 1980; Collins & Duguid, 1989; Papert & Harel, 1991; Lave & Wenger, 1991; Scardamalia & Bereiter, 1991; Schauble & Glaser, 1996; Sherin et al., 2004; Brown, 2006).

## Description of Tools of the Mind

The Tools curriculum is designed to promote executive functions and self-regulation as learned behaviors that can be facilitated. Applying Vygotsky's theory through the use of 20th century media—books, flash cards, puppets, and scripted drama activities—presents special challenges for teachers who are the interpreters and facilitators of the child's experience of the program and its highest aims. First, as agents of change the Tools materials themselves do not embody the process oriented goals of their use. Secondly, fully embracing the Tools curriculum may involve discarding previously held models of mind and psychological development by teachers. Purposeful play is at the center of classroom learning—this may appear to be a step backward for both parents and teachers who have been led to believe reading and writing readiness are paramount goals for pre-k and Kindergarten. Daily activities promote self-regulatory behaviors in children not as a strategy, but as the primary goal of education. How this is communicated to inquiring parents may create some awkward moments. The concept of self-regulation is easily mistaken for behavioral compliance by seasoned educators. In the past curriculum did not address self-regulation directly, this issue was more often considered a classroom management topic—in other words, it was the teacher's responsibility to regulate students. Teachers simply waited for executive functions to emerge of their own accord with the arrival of "the age of reason" (Lowenfeld & Brittain, 1975; Piaget, 1957, 1975).

The Tools curricula has shown that when self-monitoring is practiced, much the way we exercise our other muscles to improve our overall physical health, the child's ability to take direction, collaborate, and cooperate with peers is enhanced (Bodrova & Leong, 2003, 2005a, 2005b, 2006; Barnett et al., 2008). These are internal attributes that are crucial to the child's later success in the primary grades, and sense of agency as Marcon's and Brown & Campione's (1994, 1996) research indicates.

There is a prescribed method for organizing the Tools classroom using several different activity centers along with proprietary reading texts. The cost of adapting a well furnished pre-k or kindergarten class to a Tools classroom is approximately \$1000 - \$1500. The greatest hurdle in the transition is conveying the curriculum to teachers who are, in many instances, taking on the tasks of becoming a Tools teacher by decree from above and who bring with them a host of their own ideas about how to teach early childhood education. There are over 40 activities in the Tools curricula that address literacy and writing skills, math, science, and drama play. A comprehensive description cannot be provided here, but the following three

examples of Tools activities are discussed in the data and analysis sections, so an explanation will be helpful<sup>10</sup>:

**Buddy reading:** A main feature of literacy skill building that incorporates reflective and self-monitoring activities. Children work in pairs; taking turns reading from a book and listening.

**Symbolic mediators:** Cue cards, graphic organizers, finger puppets with special roles and messages, and games designed to help young children transition from one activity to another, or assist in enrolling them into play characters.

**Play plans:** The first writing activity of the day, a kind of work contract the child creates, serves as plan that will guide drama play activities that the child will engage in for the day. The student and teacher conference once a week to review the plans.

The current study adds to the literature on the Tools of the Mind program by focusing on the teacher's experience of learning and teaching the curriculum. Just as multiple opportunities for children to reflect on their work and play in the classroom are built into the Tools activities as a means of stimulating critical thinking, inviting teachers to reflect upon their own appropriation of the Tools curriculum as instructors might harbor insights and indicators of the success of the program in its implementation. With this in mind, the researchers followed 5 teachers through the 2009-2010 school year to listen closely to the struggles, issues, and triumphs that were arising in their classrooms.

## Methodology

A structured interview with teachers was chosen as the data collection method most appropriate to appraising the new curriculum roll-out. Information was solicited from teachers through a directed line of questioning or Socratic dialogue, with the goal of drawing out the teacher's thoughts and feelings, dispelling the notion that there are right and wrong answers. Transcripts of interviews were analyzed for themes and issues. The questions were also used as a heuristic schema in the analysis of the qualitative data. Additionally, the study structure gave the teachers an opportunity to reflect on what they were seeing and doing over and above what was required of them in the training program. Three of Knowles (1980) andragogical tenants are inherent in the design framework. They are: 1) adults learn best when they are involved in the planning and evaluation of their instruction; 2) experiences, good and bad, provide the basis for learning activities; 3) adult learning is problem-centered rather than content-oriented. There were approximately 20 - 25 teachers involved in implementing the Tools of the Mind curriculum in pre-k and Kindergarten classrooms in the school district; 5 of these teachers were chosen to participate in the study. Three interview questions were asked of the teachers at each of the three interview sessions scheduled in the fall, spring, and early summer. The interviews took place within 1 - 3 weeks after Tools of the Mind training sessions had been conducted, so that this experience would be fresh at hand. The interviews lasted approximately 45 - 50 minutes. The three interview questions asked were:

1) What are the challenges of implementing the Tools of the Mind program in your classroom, and what are your suggestions for improving training?

2) What is the program contributing to your own professional

development as a teacher?

3) What behavioral and cognitive/academic changes are you seeing in your students over the academic school year?

## Study Description

### Adoption of Tools of the Mind by School Administrators

The adoption of the Tools of the Mind program in the New Jersey school district where the study took place was undertaken by the administration and school board in 2008, and launched during the 2008-2009 school year with the expectation of doing three things:

1) Standardizing the experience of pre-k and kindergarten for all students across the district, and enhancing kindergarten instruction by going from a 1/2 day to full teaching day.

2) Acknowledging the development of social skills and self-regulation as a primary (versus secondary) goal of the pre-k and kindergarten experience, on par with the learning of academic skills.

3) Increasing the school readiness and self-regulatory behaviors of young children so that they would be better prepared to excel academically in the early primary grades.

### The School Environment

Description of the city and school district: The study was conducted in an eastern seaboard city of approximately 50,000 according to the 2010 census, located near the New York City metropolitan area. The school district serves approximately 2000 students. The following profile presented is taken from 2010 census data: The racial makeup of the city is 83% White, 3.1% African American, 0.16% Native American, 4.9% Asian, and 6.3% Hispanic. The median income for a household in the city as of the 2010 census was \$105,710 while the median income for a family was \$130,068. A growing population of the city is affluent; however, 32.5% of housing in the city is owner-occupied, while 67% is renter-occupied. Over the past six years, four new K-6 private schools have opened to compete with the local public school system.

### Choice of Subjects

Convenience sampling was used for the selection of the 5 teachers in this study. Selection was assisted by the district Superintendent's office and Director of Child Development, who were overseeing the implementation of the new curriculum project. The subjects in this study were interviewed three times over the course of the 2009-2010 school year. Of the five teachers, three were pre-k instructors, and two were kindergarten teachers. All were in their second year of teaching the Tools curriculum.

The subject group, all women, represented a varied spectrum of backgrounds and skill level. Of the five the teachers the range of years in the profession was; 33, 13, 7, 7 and 4 years of teaching in pre-k, kindergarten, and early primary grades. All had been exposed to other curriculum programs (Creative Curriculum, and arts based pre-k and kindergarten curriculum) at some point in their careers. All five teachers had college degrees, and their first choice of a profession was teaching. They were all certified to teach pre-k and early childhood education according to New Jersey state standards.

<sup>10</sup>See the manual: Bodrova, E. & Leong, D. J. (2007). Tools of the Mind: The Vygotskian approach to early childhood education.

## Thematic Analysis of Interview Data

Structured interview transcripts were analyzed for themes and issues. The themes that emerged were categorized in accordance with the three questions asked. Three main subcategories of issues emerged in this analysis for each question (See Table 1).

### Data Summary

#### Question 1—What Are the Challenges of Implementing the Tools of the Mind Program in Your Classroom, and What Are Your Suggestions for Improving Training?

##### Training Issues

The training sessions themselves were given high praise by most of the teachers. There was a notable tendency for teachers to complement the trainers and support staff about preparation of materials needed for the training sessions, and the amount of thought and effort that was being expended. The teachers uniformly agreed that active participation in the training sessions (where activities were assigned for teams of teachers to work on and then present findings/activities) was preferable to lecture delivery of subject matter. Modeling how to conduct and structure new curriculum being introduced, and having the chance to model activities themselves with feedback was also a preferred method of conducting training activities.

The Tools of the Mind website, its teacher resources, and its accessibility 24/7 also got high praise from two of the five teachers.

All five teachers struggled with balancing their need for mastery of the new program content, with reflecting on the program's impact on their students—in the researchers' opinion, this was in part a linguistic problem. In other words, their Tools training did not address their own internal experience of conceptual change brought about by the adoption of the new curricula sufficiently for them to be able to articulate their discomforts in terms of epistemological change. Another way of viewing this issue is that the Tools program training may be overly centered on the child's experience, rather than the teachers' experience of learning the method. Framing the teachers' disorientation and worries as a natural result of their own

learning process as they move toward a more complex model of mind would have helped them to consider their issues as value-added contributions to the process, and would in turn consign higher value to their own learning.

Finally, the lack of ongoing scheduled opportunities for sharing ideas and to talk with other teachers within the school system who were also involved in the project was an issue raised by four of the five teachers in many contexts over the course of the year, many times.

##### Ethical Issues

An ethical dilemma relative to integrating old teaching methods with the new curriculum presented itself for one of the five teachers in particular. The point of contention was resolving the readiness level needed or expected of children in first grade, with the level of content knowledge about reading and writing that the new Tools curriculum was providing for kindergarteners. Struggling with this issue resulted in sleepless nights. "This has real consequences for kids", the teacher stated, "some parents have approached me and said 'I feel like my kid isn't getting what they need and isn't going to be ready for first grade'".

By the end of the year the issue had resolved itself; this teacher began recognizing that the more process oriented classroom activities that the Tools program provides had in fact resulted in an increase of functional skill levels across the board in all of her students, and, even though the students did not all share the same uniform level of content information (which her old teaching method provided) she was satisfied that the children as a group were ready for first grade.

##### Classroom Challenges

The Tools of the Mind curriculum does require that teachers learn a new way of documenting student progress. Keeping up with the amount of new note taking required was a challenge for all of the teachers, and some readily admitted that they were falling behind. Two teachers questioned the purpose of constant documentation of student activities, with the complaint that taking notes was interfering with their ability to interact with students. Fitting all of the daily activities suggested into the school day posed scheduling problems for at least 2 of the 5 teachers. By year end, this issue was less pressing as the teachers' mastered new learning activities that had been introduced during the year.

There was also resistance to becoming fully involved with drama play by two of the five teachers. Reasons given were that the play scenarios offered in training were too complicated for the children to act out, and, drama play was the activity viewed as most expendable in order to fit in another activity center. From the researchers' perspective, this appeared to be an issue of not fully understanding the theoretical bridge between personal and formal knowledge that the Tools program strives to build through drama play. These are training issues. In this particular instance, one's model of mind clearly determines how you set priorities in the classroom, and how teachers integrate new information with old.

#### Question 2—What Is the Program Contributing to Your Own Professional Development as a Teacher?

##### Enhancing Classroom Management Skills

Four out of the five teachers agreed that the Tools program

**Table 1.**

Interview questions and dominant themes.

What are the challenges of implementing the Tools program?
<ul style="list-style-type: none"><li>• Training issues</li><li>• Ethical issues</li><li>• Classroom challenges</li></ul>
What is the program contributing to your own professional development?
<ul style="list-style-type: none"><li>• Enhancing classroom management skills</li><li>• Enhancing classroom instruction skills</li><li>• Program addresses multiple learning styles</li></ul>
What behavioral and cognitive changes are you seeing in your students?
<ul style="list-style-type: none"><li>• Fewer classroom behavioral problems</li><li>• More collaborative behaviors</li><li>• Higher level of verbalization and communication among children</li></ul>

was enhancing their professional development by giving them a more structured approach to classroom management (their terms). One of the interesting revelations expressed by one teacher was a growing awareness of how much she had been doing for her students, as opposed to allowing them to do things for themselves without her hovering assistance. With this new insight, she planned on backing off from being an aggressive interventionist. In her own words, “I realized how much I was doing for them—I think I was unaware of how independent they could be”.

### Enhancing Classroom Instruction Skills

Four of the five teachers also agreed that the Tools program was providing them with new activities for their arsenal of teaching techniques. One teacher felt as if she had already acquired many of the Tools program activities in principle, for example, use of mediator cards as behavioral prompts and puppet plays as a way of transitioning from one activity to another. On the other hand she did recognize that the Tools curriculum was exerting its influence on the children’s social behavior in very positive ways.

A perceptive observation from the most senior teacher was that the Tools curriculum had succeeded in blurring the boundary between what the children considered play and work in her classroom. In her own words, “I’m not hearing—‘Mrs. G—I’m done with my work, can I go play?’—anymore”.

### Program Addresses Multiple Learning Styles

It was noted by two of the five teachers in the interviews that the Tools curriculum truly provides for multiple learning styles, the visual learner, the auditory learner and the haptic<sup>11</sup> learner in a way that previous curriculum materials used did not. The visual learner gets to draw and symbolize, the auditory learner is engaged through buddy reading and role play, and the haptic learner gets to act out his or her ideas in dramatic play.

## Question 3—What Behavioral and Cognitive Changes Are You Seeing in Your Students?

### Behavioral Change

All five teachers reported fewer classroom behavior problems during the third and last interview of the school year. Reasons given included the following:

- “The kids show more patience with one another... there aren’t as many classroom squabbles”.
- “They have respect for one another”.
- “I do not have to raise my voice to get [the classes] attention”.
- “Kids are using language more to resolve conflicts... where they use to resort to hitting or shoving each other”.
- “They follow rules better”.
- “There is calmness to the classroom now”.

It is interesting to note that many of the improvements cited by the teachers are functional proficiencies describing the young students taking on greater responsibility for their learning, as well as showing a heightened level of engagement in classroom activities. These behaviors definitely fall under the category of self-regulation and greater self-reflection.

<sup>11</sup>The term haptic was authored by Victor Lowenfeld in his observations of how children approach artistic and creative problem solving. See: Lowenfeld, V. and Brittain, W. (1975) *Creative and Mental Growth*. New York, NY: MacMillan, 8th edition.

### Cognitive and Academic Change

Teachers’ observations suggested that the teachers did see cognitive changes in students’ abilities, but not all of the teachers were able to articulate the relation between the Tools curriculum activities and the emergence of new skills and abilities on the part of the students:

- “[The children] can be self-monitoring in terms of moving from activity to activity center over the course of the day”.
- “Best group of students ever in [my] seven years of teaching... by far my most independent and brightest group, but I don’t know if it has anything to do with the Tools program”.
- “They follow rules better”.

Here again, training sessions that set forth a clear framework for thinking about conceptual changes in one’s developmental model of mind may be the missing link in making these connections for teachers.

### Cognitive and Academic Change

Overall, teachers reported a higher level of verbalization and communication among students:

- “[The children] express their feelings when interacting with one another now... [for example] ‘you are making me feel sad’ which I’ve never heard before”.
- “Their attention span is greater”.
- “They are writing three or four sentences—all their own ideas. They may be spelling words phonetically, so it’s not perfect writing, but they’ve got the idea that what they say and think matters”.
- “They are more comfortable explaining and talking about what they are doing in the classroom—in drama play and in buddy reading”.

The observed increase in the student’s verbalization skills and communication with each other goes hand in hand with the perceived increase in collaborative behaviors among children. What is implied here is that academic achievement may follow from these behaviors.

## Discussion and Analysis

### Teacher Observations Confirm Empirical Findings

The interviews suggest that the implementation of the Tools of the Mind program is demanding according to teachers’ self-report. Even so, all five subjects in the study report achieving a level competence and mastery of the curriculum that is providing them with a sense of accomplishment. At the conclusion of the school year, two of the five teachers mentioned that they were thinking about applying to the Tools of the Mind Endorsed Teacher Program which would give them certification status. One cannot discount the bias, or halo effect of the researchers in this small study. As interested observers appearing on a regular basis throughout the year, we were repeatedly reinforcing the idea that what teachers have to say is important and worth documenting. Yet, what they observed as cognitive and social benefits, i.e., fewer classroom behavioral problems, more collaborative behaviors, a higher level of verbalization and communication, dove-tails with the empirical research findings of Barnett et al. (2008). This 2008 study compared Tools classrooms and a control group on a number of parameters. ECERS scores (the Early Childhood Environmental Rating Scale) and SELA scores (Support for Early Literacy Assessment) were among the tests used for assessing differences be-

tween the classes. Results showed the Tools classrooms attained higher overall levels of quality: “the [higher] ECERS scores were particularly evident on the Language and Reasoning Activities, and [classroom] Interactions subscales” (p. 310).

The concept of blurring work and play which the Tools program fosters—noted by one teacher—maybe key to the formation of an internal locus of control and self-regulation. The melding of personal knowledge and formal knowledge could be the lynch-pin to keeping children engaged in their own learning process as they move through elementary school. It is the sense of separateness, the self-imposed distinction that academic study is for someone else, which forms the crack in the armor of identity marking the beginning of the end of a successful academic career.

### Sharing Good News

Teachers report overall quality of the training was good, but inter-school communication was poor. A gulf still appears to exist between the theoretical understanding of Vygotsky’s work, his model of mind, and how it relates to academic achievement and the growth of self-regulatory behaviors in children. Important individual differences in the teachers’ ability to articulate the impacts and benefits of the program existed among the five subjects. Therefore, providing an ongoing forum for all pre-k and kindergarten teachers across the district to share their experiences on a regular basis together, and opportunities for peer-to-peer mentoring could be very beneficial to achieving superior mastery of the Tools curriculum allowing best insights to be shared. If a distinguishing characteristic of the Tools program is its model of mind, our study suggests that there were lost opportunities to discuss and use that model as a touchstone for understanding the “how” and “why” of day to day curriculum activities for instructors. This can be easily addressed, but first needs to be recognized as a problem. Ultimately, it is teachers and not curriculum materials that are the transmitters of pedagogical culture.

The two kindergarten teachers in the study also expressed the desire to reach out to first grade teachers and communicate what they were doing to facilitate a smooth transition for the children from the Tools of the Mind curriculum program to the new first-grade curriculum. If this were to become a formalized activity that occurred at the beginning of the school year, it would be a way to share the good news about the goals and objectives of the Tools program across grade levels. Any academic benefits that have accrued to young students in the Tools pre-k program may be diluted or lost if the elementary-grade teaching-staff is left in the dark about the curriculum. For example, the unique hieroglyphs used in Tools’ writing tasks may appear as gibberish to the uninitiated elementary instructor—is it fair to young students to be put in the position of being their own advocates in regard to building upon previous learning experiences?

### Conclusion

The Tools of the Mind program is still relatively young and its benefits are still being measured and assessed as children advance from pre-k and kindergarten through the primary grades. One could argue that the program’s true value is to be found in what children accomplish academically in second, third, and fourth grade. The teacher observations and reflections

in this study give us new insights into how the ongoing integration of the Tools program can be enhanced at this site, thereby improving the educational experience for students. The scale, scope, and method used in this work does not allow for generalizing its findings. Nonetheless, lasting education changes in teaching practice have to be anchored in good administrative practices and supportive work environments. What we have brought to light can best be categorized as lapses in planning and professional development activities—and these are easily remedied.

More importantly, we introduced the teacher *as collaborator* whose learning process constitutes a dynamic form of parallel play in the appropriation of the Tools curriculum with their students. We know from extensive research (Goe & Stickler, 2008; Hanusek et al., 2005; Darling-Hammond, 2000) that teacher quality is the primary factor in whether a child advances academically in almost any classroom. Extending to teachers the same attributes of mind that are highly valued for young students—i.e., the primacy of the social construction of knowledge—is central to the evolution of the education ecosystem. Regardless of research methodology, a systems approach to the study of education change and innovation enhances the application and usefulness of academic research by acknowledging that true knowledge is not gained from simple observation and measurement of things alone, but in finding the connections between things that lead to a more in-depth understanding of learning environments.

Suggestions for continued research include: 1) comparing a problem-centered vs content-oriented approach to Tools teacher training in the second year of the program implementation, with student academic outcomes; 2) knowing that adults learn best when they are involved in the planning and evaluation of their instruction, incorporating ongoing discussions of epistemological change among Tools teachers in future research evaluation rubrics to better assess conceptual transformation.

### Acknowledgements

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### Revised Pricing Schedule

For each Attachment D completed, enter the requested information for the professional development offering in Table I, II, III, or IV, on the following pages as appropriate, based on the proposed delivery method. Points will be awarded for price based on the relative per hour prices for each of those four tables.

**Example Table I.** If professional development offering “X” is face-to-face, the “length of delivery” per Attachment D, #4 is 16 hours, the total price for 25 participants is \$3,200, and the price per hour is \$200 ( $\$3,200/16$ ), it would be entered on Table I as follows:

**Complete this Table for all professional development to be delivered face-to-face:**

Name of Professional Development Offering	Professional Development Categories	Total Cost for 25 participants	Length of Delivery (in hours)	Per Hour Price
X	a	\$3,200	16	\$200

**Example Table II.** If professional development offering Y is online, but is interactive and participants are responding to a presenter or asking questions, the length of delivery is 16 hours, the total price for 25 participants is \$1,600, and the per hour price is \$100 ( $\$1,600/16$ ), it would be entered on Table II as follows:

**Complete this Table for all interactive online professional development:**

Name of Professional Development Offering	Professional Development Category	Total Cost for 25 participants	Length of Delivery (in Hours)	Per Hour Price
Y	o	\$1,600	16	\$100

**Example Table III.** If professional development offering Z is online, but is not interactive, the length of delivery is 10 hours, the total price regardless of the number of individuals who access the online professional development is \$200, and the per hour price is \$20 ( $\$200/10$ ), it would be entered on Table III as follows:

**Complete this Table for all online professional development that is NOT interactive:**

Name of Professional Development Offering	Professional Development Category	Total Cost for unlimited participants	Length of Delivery (in Hours)	Per Hour Price
Z	o	\$200	10	\$20



**Table I. Complete this Table for all professional development to be delivered face-to-face (in-person):**

[illegible]



**Table II. Complete this Table for all professional development to be delivered virtually or online in an interactive format (e.g. via Webinar):**

<b>Name of Professional Development Offering</b>	<b>Professional Development Category (categories) a – o as indicated on the applicable Attachment D</b>	<b>Total Cost for 25 participants</b>	<b>Length of Delivery (in Hours) as indicated on Attachment D, #4.</b>	<b>Per Hour Price</b>

**Table III. Complete this Table for all professional development to be delivered virtually or online that is NOT delivered in an interactive format (e.g. play and listen):**

<b>Name of Professional Development Offering</b>	<b>Professional Development Category (categories) a – o as indicated on the applicable Attachment D</b>	<b>Total Cost for unlimited participants</b>	<b>Length of Delivery (in Hours) as indicated on Attachment D, #4.</b>	<b>Per Hour Price</b>

**Table IV. Complete this Table for all professional development to be delivered via a combination of live and virtual/online methods:**

<b>Name of Professional Development Offering</b>	<b>Professional Development Category (categories) a – o as indicated on the applicable Attachment D</b>	<b>Total Cost for 25 participants</b>	<b>Length of Delivery (in Hours) as indicated on Attachment D, #4.</b>	<b>Per Hour Price</b>
Tools of the Mind Preschool/Pre-K Professional Development Series	A, b, c, d, e, f, g, h, I, j, k	\$37,687.50	34	\$1,108.45

**Table V.** If you also wish to propose that professional development be delivered via another method, you may repeat the name of a Professional Development Offering listed above in the Table below for our consideration of the alternate delivery method. Since it will not be possible to make an “apples to apples” comparison for prices in this table, prices in this table will not be used for awarding points for price, but may be considered in final negotiations.

<b>Name of Professional Development Offering (as indicated in Table I, II, III, or IV)</b>	<b>Proposed Delivery Method</b>	<b>Length of Delivery (in Hours)</b>	<b>Number of Participants included in total price</b>	<b>Total Price</b>